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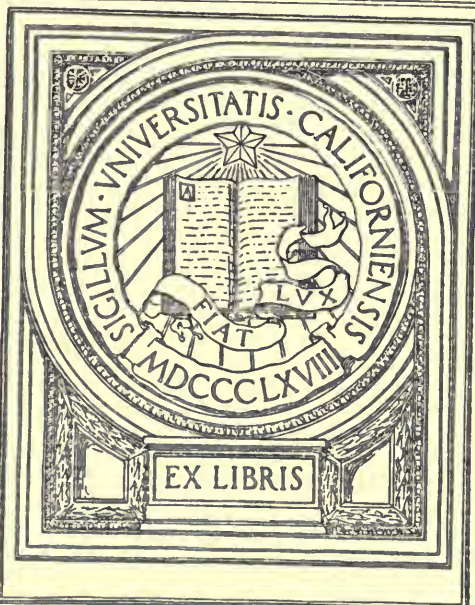


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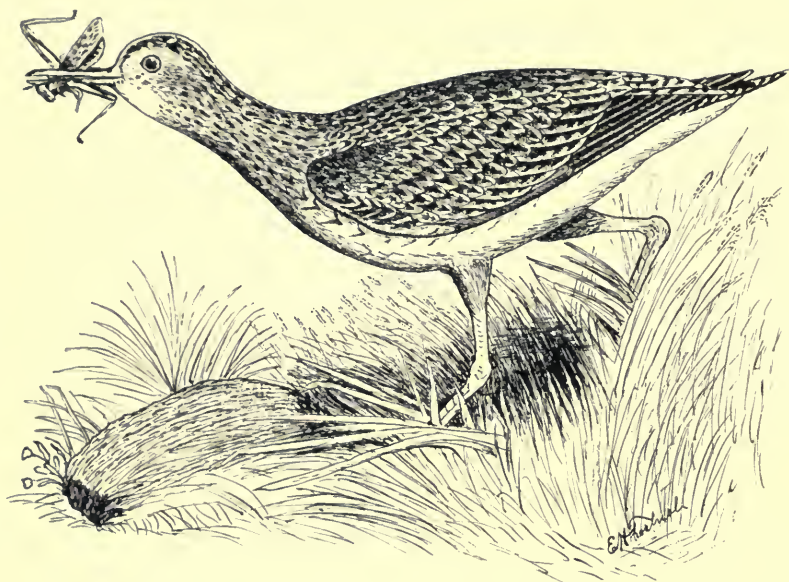
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THE BARTRAMIAN SANDPIPER OR UPLAND PLOVER.
A Useful Bird, now in Danger of Extermination.

SPECIAL REPORT

ON THE

DECREASE OF CERTAIN BIRDS, AND ITS CAUSES,
WITH SUGGESTIONS FOR BIRD PROTECTION.

BY

EDWARD HOWE FORBUSH.

PREPARED UNDER THE DIRECTION OF THE MASSACHUSETTS STATE BOARD OF
AGRICULTURE.

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THE DECREASE OF CERTAIN BIRDS, AND ITS CAUSES, WITH SUGGESTIONS FOR BIRD PROTECTION.

BY EDWARD HOWE FORBUSH, ORNITHOLOGIST TO THE BOARD.

In the pursuit of an inquiry regarding the destruction of birds by the elements, which was authorized by this Board in 1903, some evidence was obtained relating to a decrease in the number of birds from other causes. It was asserted by correspondents that the extermination of certain species was already imminent, and that many others were rapidly decreasing in numbers. The secretary of the Board, upon being informed of this evidence, authorized an investigation of the alleged decrease and threatened extirpation of useful birds, with a view to determine what species had suffered most, and whether it would be practicable to furnish them better protection. Four hundred circulars requesting information were prepared and sent out in July. They were mailed to naturalists, officers of the Audubon Society, correspondents of the Board of Agriculture, secretaries of game protective associations, taxidermists, officers of the Massachusetts Commissioners on Fisheries and Game, sportsmen, market hunters, principals of academies, and intelligent observers generally.

It was intended to compile the evidence, when received, into the form of a bulletin; but this proved impracticable, on account of the vast amount of material returned in answer to the inquiry. It was finally decided to prepare a special report on the subject.

Some of the circulars returned contained little information, but two hundred and seventeen of them furnished data of more or less value. Several correspondents sent excellent annotated local lists. About one hundred letters also

were received. Most of the reports and letters were from Massachusetts, representing every county of the State, but a few came from other States. A list of observers and correspondents is appended to this report.

THE DESTRUCTION OF BIRDS BY THE ELEMENTS.

The unusual weather of 1903-04 was the evident cause ~~of a recent scarcity of certain species mentioned in many cases by correspondents.~~ This additional evidence of the effects of the June storms of 1903, or of the winter of 1903-04, will be presented (1) as a sequel to the report of last year, and (2) in order that the results produced by the elements in less than two years may not be confounded with those effected by other and more continuous destructive forces.

In glancing over the reports for 1904, it becomes evident at once that the destruction of eggs and nestlings by the June storms of 1903 caused no great noticeable and generally observed decrease of many species in 1904. This may be accounted for in part by the fact (1) that some of the species affected rear more than one brood in a season, and so were able to bring up young either before or after the storms; and in part by the theory (2) that a large share of the young birds reared each season never return from their southern journey, but succumb to accidents and fatalities on the way; therefore a great mortality among the nestlings of one season may not have a very noticeable effect the succeeding year.

Trained observers, however, noted in their localities a marked decrease of certain breeding warblers, chimney swifts and swallows, although a few reported swifts and swallows as common or abundant. On some of the meadows overflowed in 1903 red-winged blackbirds and marsh wrens were much reduced. Long-billed marsh wrens have nearly disappeared from certain meadows where they were formerly common. Bobolinks, orioles and vireos are mentioned particularly as scarce locally the past season. Night hawks and whip-poor-wills have disappeared from some localities. Mr. Thomas M. Burney of Lynn reports a 75 per

cent decrease in warblers. Mr. Rufus H. Carr of Brockton reports breeding black-and-white warblers, prairie warblers and redstarts in about half their usual numbers, martins gone, swifts comparatively scarce, and the barn swallow the only swallow commonly seen.

Most of the common birds appeared in about their usual numbers in the migrations, but no considerable flight of the warblers, which nest mainly north of Massachusetts, was reported. As in 1903, these warblers were again comparatively scarce in their migrations. The flight seemed very light in Bristol, Plymouth and Middlesex counties, where I watched it. Mr. Louis Cabot reports warblers as uncommon at North-east Harbor, Me., but common at Grand River, Can. This is a typical report; but some few observers report birds generally as more numerous than in 1903. Mr. Outram Bangs tells me that in Wareham, where, he believes, all the tree swallows were killed by the storms in 1903, the nesting-boxes were occupied again in 1904 by this species, probably by newcomers. Chimney swifts are reported quite generally as absent, rare or reduced in numbers. Mr. Geo. E. Whitehead of Millbury records that "upward of five hundred" dead swifts were taken from a factory chimney in that town in 1903; and that during the season of 1904 he watched a large chimney formerly frequented by many swifts, and never saw one enter it. In my own experience, in parts of Bristol, Plymouth and Middlesex counties swifts were either much reduced or rare locally throughout the season until the flight in August, when they were seen in numbers in some localities. At that time, one afternoon, I saw about thirty birds in Billerica, which were more than I had seen elsewhere; but the next morning only one was seen. Messrs. William Brewster and Ralph Hoffman report swifts as common in Cambridge and Belmont respectively.

The birds had a good breeding season in 1904, and probably most species will soon recover from the check they received by the June storms of 1903, except, perhaps, the purple martins, which seem to have been almost absent from Massachusetts in the breeding season of 1904. Martins were looked for in April as usual. A few birds were reported,

unusually early, from six localities. These were thought to be some of the breeding birds which had escaped the catastrophe of 1903; but so far as can be learned, they all disappeared. Their probable fate may be inferred from the story of Mrs. Frank H. Watson of Concord.

Mr. Watson has two large bird-houses which have been well filled with martins for years, but, apparently, the birds all died during the storms of June, 1903. Mrs. Watson says that two pairs of martins came to the boxes earlier in April, 1904, than usual, but were not seen during, or after, the cold wave and snowstorm which followed the 19th, when some five inches of snow fell. Later, Mr. Watson examined the bird-houses, and found three of the birds dead within.

Twenty-six observers from the different counties of Massachusetts report martins as having disappeared; three report them as nearly extinct; five, as rare; eight, as rare and decreasing; one, "as usual." In response to letters of inquiry sent out later to these and others, it was learned that nearly all the reports referred to migrating birds. Further extensive correspondence leads to the belief that we have no fully authenticated record of the breeding of the purple martin in Massachusetts this season, except in five localities. Mr. Robert O. Morris speaks of four small colonies in or near Springfield, which are still in existence, but one of these has decreased one-half in numbers. Miss Emily B. Adams, also of Springfield, speaks of two colonies, probably some of the same, but says the birds are being gradually driven from their boxes by the English sparrows. Mr. F. H. Mosher writes from Shawmut post-office in New Bedford that a single pair of birds reared their young there. Mrs. Mary R. Stanley of North Attleborough, in the same county, and near the Rhode Island line, says the martins are nearly extinct there, but are still breeding at West Attleborough, where her brother saw two birds feeding their young. Col. John E. Thayer says martins are still breeding at Lancaster; and Mr. William Holden states that a few pairs of birds occupied, and probably bred in, one bird-house in Leominster. Capt. A. B. C. Dakin of Concord

states that a single pair of martins were resident at a neighbor's bird-house, but failed to raise any young. This may be accounted for by the fact that the English sparrows, which are notorious for killing young martins, occupied the same domicile. Mr. Fred. C. Dodge says that martins, which arrived ten days later than usual, occupied a small nesting-box near his house in Beverly, and thinks they probably bred.

We have records, therefore, of martins breeding in but three counties in the State, — Hampden, Bristol and Worcester, — with the probability that they bred in Essex County.

What prospect is there that the species will eventually increase in numbers, and reoccupy its old breeding places? It seems probable (1) that some martins may have survived and bred in places not reached by this inquiry; the few birds left may form the nuclei of new martin colonies. Probably also (2) martins breeding in parts of northern New England, and migrating through Massachusetts, may, in time, overflow into this State. (3) Martins are said to be breeding still in Connecticut, New Hampshire and Rhode Island, not far from the Massachusetts line; and there is some probability that these colonies may spread over our borders, although their numbers are much reduced. Mr. Robert Curtiss of Stratford, Conn., where martins were abundant in the spring of 1903, says that only one was seen there in 1904; but Mrs. Mabel Osgood Wright says they are still breeding at Stamford. Mr. Morris reports that martins are numerous at Windsor Locks, Conn., about twelve miles south of Springfield, Mass., and, as numbers of them probably migrate up the Connecticut valley, the repopulation of Massachusetts by martins may be expected to progress as rapidly there as anywhere. It seems to be believed, however, by most careful observers that the martins were diminishing in Massachusetts before 1903. For this decrease the English sparrow was largely responsible. The sparrows are now occupying most of the boxes where the martins formerly dwelt, and, when firmly intrenched therein, they may be able to prevent the martins from retaking the boxes. On the other hand, the decrease of

martins and swallows is likely to be followed by an increase of the insects on which they feed. This will probably attract these birds into the State, and favor their breeding; but, unless boxes are generally put up for the martins, and the English sparrows kept out, the martins may never again become common in Massachusetts. The June storms of 1903 will long be remembered as the chief cause of the passing of these beautiful and useful birds.

The effect of the hard winter of 1903-04 upon our resident birds seems not to have been very serious except with a few species. The bob-white, or quail, has been nearly exterminated over much of the State. The ruffed grouse, or partridge, although considerably reduced in many sections, appears to have bred well in the western half of the State in 1904, and has done well locally in the eastern counties. Many dead blue jays were found during the winter, and in some sections jays, crows and chickadees seem to have been much reduced in numbers, but this is by no means universal. I found jays somewhat reduced in Wareham, but crows had increased. Both crows and jays were considerably reduced in Concord, while chickadees were not so common as usual in either place. Some reports from south-eastern Massachusetts indicate a scarcity of flickers and meadow larks, but this is seldom noticed elsewhere. Screech owls suffered severely, and were driven by stress of weather into barns and dove-cotes, where they fed on mice and doves. Mr. A. M. Frazar, the Boston taxidermist, informs me that he had about forty of these birds brought to him, most of which had been taken in dove-cotes. Some were picked up dead. He also received about twenty Acadian or saw-whet owls, that were found dead either in the streets of Boston or in the country districts. Many observers report a recent scarcity of screech owls, while others report them as numerous. My own notes show them to have been rather rare in 1904 where in 1903 they were quite common. Superintendent Charles P. Price of the Middlesex Fells Reservation found several barred owls apparently frozen to death during the winter; they were fat, and therefore had not starved.

Evidently the bob-white suffered more than any other bird from the hard winter of 1903-04; but as many have been introduced since by the Massachusetts Fish and Game Protective Association, and others were carried through the winter by feeding, there are birds enough now to restock the State, if they can be protected.

It is fair to conclude, therefore, that, excepting, perhaps, the purple martin, no species has suffered a lasting or permanent check from the action of the elements in 1903 or 1904.

THE EARLY ABUNDANCE OF BIRDS IN MASSACHUSETTS.

No investigation into the decrease of birds and its causes can be conducted intelligently without some knowledge of the relative abundance of the different families of birds at the time of the first settlement of the country. Had we any full and trustworthy account of the animals of New England, from the pen of some naturalist of the seventeenth century, we could better understand the changes that have occurred in the bird fauna of New England since the discovery of the country. As it is, we must derive our information from the brief, fragmentary and rather unsatisfactory accounts written by some of the early voyagers and settlers. We shall learn little of the smaller land birds of the country from these narratives; but all agree that there was "greate store" of water birds, "sea fowle" and game birds.

From Archer's relation of "Captaine Gosnol's voyage to the north part of Virginia," made in 1602, we learn that the "penguin" (great auk) was found on our shores. This bird evidently was once abundant at certain points on the coast. Early historians refer to birds now extirpated from this region as then existing in great numbers. Swans, cranes, wild turkeys, snow geese, passenger pigeons and other birds, now either rare or extinct here, were then found in great abundance. There were also then, as now, "divers sorts of singing birds whose notes salute the ears of travelers with an harmonious discord."

Capt. John Smith credits the land with an incredible

abundance of fish, fowl, wild fruits and good timber. Francis Higginson writes: "Fowls of the aire are plentiful here. Here are likewise abundance of turkies often killed in the woods. — This country doth abound with wild geese, wild duckes, and other sea fowle, that a great part of the winter the planters have eaten nothing but roastmeat of divers fowles which they have killed." *

Josselyn writes that he has known "twelve score and more of sanderlins" to be killed at two shots.†

Morton says there was "greate store" of swans in the Merrimack River at their seasons, also "greate store" of cranes in the country. He also speaks of two Indians having seen a thousand turkeys in less than a day in the woods.‡

William Woods speaks of the turkeys as being in flocks of forty, sixty and one hundred birds. He says the settlers shot, for their own use, those which went by their doors. He speaks of vast flocks of wild pigeons passing over where he was, and of "seeing neyther the beginning nor ending, length or breadth of these Millions of Millions. The shouting of the people, the rattling of gunnes and the pelting of small shotte could not drive them out of their course and so they continued for four or five houres together." He describes great flights of Brant, gray geese, white geese and wild ducks; and says the gray geese stayed all winter in these waters, while the others were seen only in spring and fall. He asserts that some have killed a hundred geese in a week, and fifty ducks or forty teal at a shot. The "humilities" or "simplicities" as he calls them, referring to shore birds, large and small, could be driven in a herd like sheep, and shot "at a fit time," after which the living would settle again among the dead. "I myself," he says, "have killed twelve score at two shootes."

Morton says that he has often had one thousand geese before the muzzle of his gun, and that the feathers of the geese he had killed in a short time paid for all the powder and shot he would use in a year. He speaks of seeing forty "partridges" in one tree and sixty "quail" in another. Un-

* "New England's plantation," by Francis Higginson, p. 11.

† "Account of two voyages to New England," 1638-63, by J. Josselyn.

‡ Morton's "New English Canaan," p. 74.

doubtedly these were the same species that are now generally known in Massachusetts by these vernacular names.

Geese were fed to the dogs and pigeons to the hogs; but, notwithstanding the great waste of bird-life, no appreciable effect on the abundance of the birds was noticed during the first years of settlement, for Woods says that, in spite of the shooting and the "frighting of the fowle" . . . "I have seene more, living and dead, the last yeare than I have done in former yeares." *

THE DECREASE OF BIRDS IN PAST CENTURIES.

The great auk soon disappeared. The great cranes, both brown and white, birds of the open country, were annihilated by the settler's rifle. The Canada goose, which was once found in the State throughout the year, and probably bred about the inland ponds and marshes, was driven out, and became a mere migrant in spring and fall. The wild turkey and heath hen were hunted away to the deep woods; but geese, ducks, shore birds, passenger pigeons and ruffed grouse still existed in abundance until the early part of the nineteenth century.

An old gentleman named Greenwood, a responsible man, who was once keeper of the Ipswich Light, told me in 1876 that in the early part of the century (I have no memorandum of the date) he, with his father and brothers, had to get oxen and sled to haul home the birds, mainly geese and ducks, which they had killed in one day about Thanksgiving time near the mouth of the Ipswich River.

Dwight tells us, in 1821,† that there were then hardly any wild animals remaining besides a few small species; that wild turkeys had greatly lessened in numbers, and in the most populous parts of the country were not very often seen; that grouse were not common, but that water-fowl still existed in great abundance.

This brief glance at two centuries of the history of Mas-

* William Woods' "New England's prospect," from which this was taken, was first printed in London in 1634.

† Dwight's "Travels in New England and New York," 1821, Vol. I., pp. 52-55. The grouse spoken of here is probably the heath hen, as Dwight and other writers mention this bird as the grouse or pheasant, — a bird distinct from the partridge, or ruffed grouse, and never as common.

Massachusetts game birds and their destruction brings us to a time within the memory of a few persons now living, and almost within the scope of the present inquiry.

In the first volume of the "Memorial History of Boston," published in 1880, Dr. J. A. Allen, one of the most eminent of American naturalists, writes of the birds of eastern Massachusetts as follows: "The great auk, the Labrador duck, and five or six other species, have long since disappeared from southern New England. All the larger species and many of the shore birds have greatly decreased, as have likewise most of the smaller forest birds. The few that haunt cultivated grounds have doubtless nearly maintained their former abundance."

In 1898, Director William T. Hornaday, of the New York Zoölogical Park, made an inquiry into the decrease of birds and mammals in the United States. He estimated, from reports received by him from naturalists in many parts of the country, that birds had decreased on the average 46 per cent in thirty States and Territories within the fifteen years then just past, while their reduction in Massachusetts was estimated at 27 per cent. This report has been widely quoted, and very generally credited by the public.

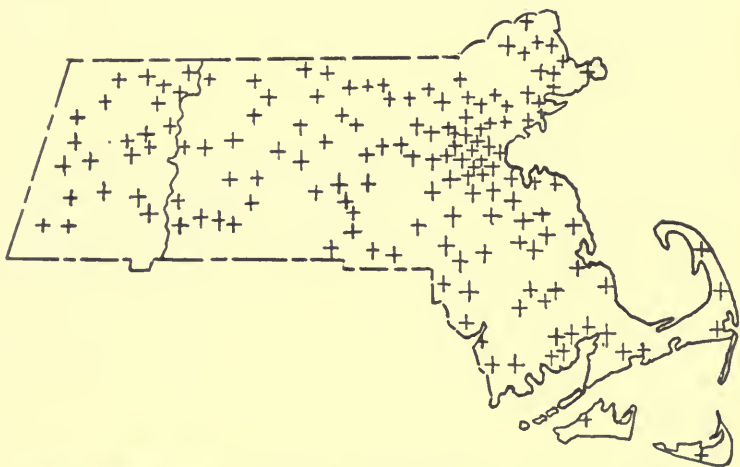
THE DIFFICULTY OF ACQUIRING ACCURATE INFORMATION.

It is difficult to get accurate information as to the increase or decrease of bird-life in a region so large as the State of Massachusetts. A conclusion one way or the other cannot safely be formed by any individual unaided, except in regard to a limited territory with which he has been familiar for a series of years. Such a conclusion, when formed, is merely an opinion, and the personal equation inevitably comes in to bias it. Some people are naturally optimistic, and their reports show it; or they have recently begun to study birds, and see more of them now than in former years. Others are pessimistic, or have become imbued with the popular belief that our birds are rapidly being exterminated. Some are elderly people, who do not, perhaps, see nor hear so clearly as in their youth, and are not so much afield, and so do not notice so many birds as in their younger days.

Some reports come from closely populated regions, where many causes operate to destroy or drive out the birds; others come from more sparsely peopled regions, where the birds and their natural enemies are not so much interfered with. These personal or environmental differences tend to produce contradictory reports. Where there is conflicting testimony, it must be carefully weighed, and all contradictions considered by the one who has to render the final verdict. In this, the evidence of those experts who for years have kept careful notes of the number of birds seen should have the most weight.

A SUMMARY OF REPORTS, BY COUNTIES.

Below is a summary, by counties, of the reports regarding the gain or loss in numbers of birds in the State for the past ten to forty years. The questions asked were: —



Map of Massachusetts, marked to show the localities from which reports have been received.

1. Are birds decreasing in your locality, county, or in the State generally?
2. How do their numbers compare with those of ten years ago? Three-fourths as many, one-half, one-third, or do they remain about the same?
3. Has the decrease (if any) been continuing for twenty, thirty or forty years, or longer?

Some correspondents failed to answer these questions, and others answered rather indefinitely. The definite answers received are tabulated below. Seventy-three of those who regard birds generally as diminishing in numbers estimate the percentage of decrease as follows: one, 10 per cent; one, $12\frac{1}{2}$ per cent; twenty-one, 25 per cent; one, 30 per cent; six, $33\frac{1}{3}$ per cent; thirty-three, 50 per cent; five, $66\frac{2}{3}$ per cent; three, 75 per cent; two, 90 per cent. Eleven state that birds are decreasing somewhat, but give no estimate of the percentage; those also who regard birds in general as increasing give no percentages. It is impossible, therefore, with the figures at hand, to arrive at the average *opinion* as to the percentage of decrease of the birds in the State, to say nothing of the *facts* in the case. To get at even an approximation of the facts, other methods must be employed.

The table shows that a large share of the reports were pessimistic, and on its face, perhaps, presents a darker picture than the facts will warrant.

A Tabulated Statement, by Counties, of the Reports regarding the Decrease of Birds.

COUNTY.	Number reporting that Birds are decreasing.	Number reporting that Birds are holding their Own.	Number reporting that Game Birds are decreasing and Song Birds increasing or holding their Own.	Number reporting Birds increasing.
Berkshire, . . .	9	1	3	—
Hampshire, . . .	6	4	1	—
Hampden, . . .	8	6	1	1
Franklin, . . .	3	5	1	—
Worcester, . . .	20	8	2	1
Middlesex, . . .	17	6	4	5
Essex, . . .	12	4	4	2
Norfolk, . . .	5	4	1	1
Suffolk, . . .	4	1	—	1
Barnstable, . . .	2	—	—	—
Plymouth, . . .	5	2	1	2
Bristol, . . .	3	6	1	1
Dukes, . . .	—	1	—	—
Nantucket, . . .	—	—	1	—
Total for State, .	94	48	20	14

It will be seen by the above table that ninety-four correspondents report birds as decreasing; only sixty-two report them as either holding their own or increasing. If we add to this number, however, the twenty who regard game birds or other larger species as diminishing, and song birds or the smaller species as stationary or increasing, we shall have eighty-two who believe that the smaller species are either stationary or increasing, against ninety-four who believe all birds are decreasing. Next, we find that forty-three who report birds as rapidly diminishing live in or near the larger cities, where the principal causes of this diminution are most active. There are, then, only fifty-one persons, outside of the influence of the cities, who find birds generally decreasing, to eighty-two who find the smaller birds at least holding their own. This being the case, it seems probable that the smaller birds in general have not decreased greatly in Massachusetts, as a whole, in recent years, except in and near the centres of population. Undoubtedly there are fluctuations in the numbers of certain species over large areas. There are also local fluctuations in the numbers of most species. Certain birds will be rare in a locality for a year or two, and then, perhaps, plentiful again. The reports plainly show such oscillations; but it may be doubted if there is any great and general decrease in all the smaller species.

Mr. Hornaday, by pursuing a similar method of inquiry six years ago, arrived at a somewhat different conclusion. How can this discrepancy be explained? In the first place, Mr. Hornaday apparently based his Massachusetts report on the statements of only eleven people, as against those of two hundred who have responded to the present inquiry. In the second place, seven out of his eleven correspondents lived in or near cities, where birds were, or had been, decreasing.

But it may be said that the testimony taken by him was more in the nature of selected expert evidence than that obtained in the present inquiry. To meet this objection, extracts from thirty-five reports have been selected. These observers may be said to belong to the same class as those

from whom Mr. Hornaday received his information. The names of three of his correspondents appear in this list. Circulars were sent to the other eight, but they failed to return them.

EXPERT EVIDENCE.

Nantucket County.—Mr. George H. Mackay of Boston, well known as an authority on Massachusetts sea-fowl, wild-fowl and shore birds, who is very familiar with Nantucket, says that shore birds generally are decreasing; some species have fallen off from 66 per cent to 98 per cent in sixty years. Other species have not decreased so much, or remain about the same. He has noticed no general decrease among the smaller land birds.

Bristol County.—Mr. F. H. Mosher of Dartmouth reports that some species are decreasing, others remain about the same, and a few seem to be increasing. He says the decrease of certain species has been progressing for at least twenty years. Mr. Arthur C. Bent of Taunton says that, generally speaking, birds are not materially decreasing. In some few cases they are, but the numbers remain about the same as a whole. Mr. Elisha Slade of Somerset says that in his locality practically all native species are decreasing. The decrease has been continuing spasmodically, he says, for forty years. He estimates the falling off of certain species within thirty years as follows: quail, ruffed grouse, herons and nighthawks, 50 per cent; mourning doves, purple martins and house wrens, 75 per cent; bank swallows, barn swallows, flickers, swifts, warblers and thrushes, 30 per cent.

Plymouth County.—Mr. Arthur Curtis Dyke of Bridgewater reports some species as certainly decreasing. Among these he mentions, mainly, swallows, birds of prey, game birds and wild-fowl. Mr. Rufus H. Carr of Brockton says: "Not appreciably decreasing, except certain species. Game birds and herons, one-third; hawks and owls, one-fourth."

Norfolk County.—Mr. Henry B. Bigelow of Cohasset says: "I believe that birds are decreasing only slightly in this locality. There is a great yearly variation in numbers. A great decrease in shore birds and water-fowl took place

about five years ago." Mr. Frank Blake Webster of Hyde Park writes: "I see no decrease in twenty years. Woodcock seem scarce." Mr. I. Chester Horton of Canton believes that quail, grouse, screech owls, purple martins, house wrens, barn swallows, whip-poor-wills and indigo birds are diminishing, while bluebirds are increasing. Mr. R. M. Baldwin of Wellesley Hills writes that in Wellesley there is a marked decrease in larger birds, a possible increase in the smaller. Mr. F. H. Kennard of Brookline says: "In Brookline they are decreasing; swallows driven out by building up of town."

Suffolk County. — Mr. Homer Lane Bigelow of Boston says that from 1889 to 1897 there was an annual decrease, but since then, with exceptions (*i.e.*, 1903), there has been a gradual increase. Mr. F. H. Allen of Boston expresses a disbelief in any general decrease in the number of birds in the region he is best acquainted with, although certain species are driven out of their accustomed haunts by the extension of city influences into the country, the cutting down of woods, etc. Mr. C. S. Day of Boston, who is also acquainted with conditions in Chathamport, Barnstable County, says birds are decreasing. "I should judge about one-half. I have noticed the decrease particularly the last fifteen years." Hawks, owls, the swallow family, game birds, the house wren, the swift and shore birds are the birds most particularly mentioned as decreasing.

Essex County. — Mr. F. C. Dodge of Beverly says that in the last three years there has been an increase, previous to that a decrease. He says there are not so many birds in the city as formerly, but about the same number in the nearby country. (All observers but one from Beverly report some increase in birds there.) Mr. Reginald C. Robbins of Boston states that, in Essex County, wilderness birds only are decreasing; suburban birds remain about the same; others fast decreasing locally, but holding their own in favorable spots. Mr. J. A. Farley says: "Speaking from ten years' experience in certain towns in southern Essex County, should say, on the whole, birds remain about the same; horned owls, sharp-shinned hawks and red-tailed

hawks are a good deal reduced." Dr. Charles W. Townsend, from twenty-eight years' experience, mainly in two towns in Essex County, concludes that shore birds have decreased considerably; but, notwithstanding smaller birds have decreased about the cities, they are holding their own very well in the country.

Middlesex County. — Mr. C. J. Maynard of Newtonville, a field naturalist of many years' experience, says: "Many species have decreased at least one-half. Some hold their own. A few have considerably increased. Excepting in a few species, I do not see much decrease in the last ten years. Swallows are going fast." Mr. Ralph Hoffman of Belmont writes: "The larger birds (hawks, herons, grouse) are decreasing; the smaller birds are about the same. Grouse no longer occur." Mr. Philip T. Coolidge of Watertown writes: "Some species are decreasing. Fully three-fourths as many birds as ten years ago. Bob-whites, hawks, the larger owls, ducks, shore birds, gulls and terns suffer much from shooting." Mr. E. F. Holden of Melrose says: "Birds have decreased within ten years, also within two years; perhaps three-fourths as many as ten years ago, possibly less." Mr. William Brewster of Cambridge and Concord, the leading ornithologist of New England, who has been afield much for the past forty years, says: "Birds do not appear to be decreasing generally, but there has been a decrease among swallows, martins, nighthawks, game birds, birds of prey, certain water-fowl and waders. I should say that the decrease in woodcock, partridges, wood ducks, certain other of the ducks and many of the waders (plover, sandpipers, etc.) had been continuing ever since I can remember, or upwards of forty years." Mr. C. E. Bailey of North Billerica says that birds are much reduced in numbers in his locality. Miss Elizabeth S. Hill of Groton, who has kept a careful annual record, says that some birds are increasing and some decreasing, but that for the past ten years the per cent of increase is the larger. Her list shows that the principal decrease is found among the herons, ducks and birds of prey; the increase is mainly among the smaller species.

Worcester County. — Dr. C. F. Hodge of Worcester reports birds as increasing rapidly on his premises, and he believes there are more in the city than three or four years ago. Dr. Hodge is a professor in Clark University, and a leader in nature study at Worcester. He takes a careful bird census each year, destroys the English sparrows and other enemies of birds, puts up bird-houses, feeds birds, and teaches the children not to molest them, — all of which may account for the increase of birds in his vicinity. Mr. William S. Perry of Worcester, who has had a long experience as a field ornithologist, sportsman and teacher, and who is familiar with many towns in northern Worcester County, says: "Some species have remained about the same for the last thirty years; others are exterminated; others are decreased one-half. Most show decrease, some increase." Dr. Lemuel F. Woodward of Worcester, whose observations have extended over more than thirty years, believes that hawks, owls, eagles, game birds, nighthawks, swallows, warblers and thrushes are decreasing. Col. John E. Thayer of Lancaster writes that he has been in the woods nearly every day between March 15 and July 1 for the past eight years. He says that, with the exception of four species, birds have not decreased in his locality. Mr. Charles E. Ingalls of East Templeton, who has had a large experience as a field observer, and has travelled much about the State, says that birds are decreasing in his town, county and State. He says a gradual decrease has been apparent for thirty or more years, accelerated during the last ten years. Mr. C. E. Stone of Lunenburg believes that insectivorous birds are rather on the increase. "A few species, notably the game birds, are not as plentiful as formerly."

Hampshire County. — I have received no report from any ornithologist in this county, so present the reports of observers in whose judgment I have confidence. Prof. Wm. P. Brooks of Amherst writes: "Should say birds are not decreasing in this vicinity." Dr. H. T. Fernald, also of Amherst, having consulted with Prof. R. F. Nelligan in regard to game birds, believes there is some decrease, but assigns the weather as one cause.

Hampden County.—Mr. Robert O. Morris of Springfield says that, generally, birds are not decreasing in his vicinity. He speaks of a decrease in owls, hawks and herons. Mr. F. H. Scott of Westfield thinks birds are not decreasing there. “Some years ago a scarcity of some of the smaller birds was apparent; recently there has been an increase among many.”

Berkshire County.—Mr. J. M. Van Huyck of Lee thinks birds are decreasing, but the decrease is assigned mainly to the larger species; the smaller species seemingly are on the increase. Hawks, owls, eagles, game birds and herons have decreased much, according to his observations.

On the whole, the above-mentioned observers apparently have not seen a great decrease in the numbers of the smaller birds except in the case of a few species; but the older observers record a considerable diminution within forty to sixty years among game birds, water-fowl and shore birds.

My own experience as a resident of the suburbs of Worcester and Boston, if taken alone, might lead me to believe that the smaller native birds have fallen off much within the last thirty years throughout the State, as they certainly have in those cities; but in many of the country districts I find the majority of the smaller species still in nearly the same numbers as thirty years ago. I do not find small birds as numerous in Plymouth and Bristol counties, or in sections of Middlesex County, as they were in Worcester County thirty years ago. The fertile soil of Worcester, one of the richest agricultural counties in the world, supports more birds to the acre than the sandy soil of Plymouth and Bristol counties, or the gravelly hills of some parts of Middlesex. The large number of cities in eastern Massachusetts, with their ever-increasing population flooding the surrounding country, must have had a seriously restrictive effect on the bird-life of this section. No one will question the fact that the sum of bird-life must have been somewhat reduced in this region by the growth and expansion of the cities, and the destructive and repellent forces which radiate from them into the surrounding country; but, outside of a

certain radius from each city, the conditions of bird-life still remain much the same (for most of the smaller species) as they were in much of the city itself forty years ago. This may be illustrated by the experience of Dr. L. F. Woodward of Worcester. He says: "I am confining my observations of bird-life to two localities: first, my home in the centre of the city of Worcester; second, the grounds and adjacent country about the Quinsigamond Boat Club at Lake Quinsigamond. First, the city. Thirty years ago, robins, catbirds, tree swallows, chipping sparrows, vireos and summer warblers built in our garden; now, nothing builds about the site of the house but the robins and chipping sparrows. For three years no young robins have been raised in our yard. The sparrows either destroy the nests, or the cats get the birds. The chimney swifts, which formerly were fairly abundant about the site, are very much diminished, also the nighthawk. Second, at the Quinsigamond boat club grounds the English sparrows were absolutely exterminated three years ago, and are not a factor in bird-life in that particular region. The birds as a whole have become rather more numerous and much tamer than formerly. The white-breasted swallows, having abundant house accommodation, have increased, but this year have rather decreased. The chimney swifts, once quite numerous, were reduced this year to three individuals. Locally, the thrasher, veery and chewink have increased, as has also the field sparrow. The whip-poor-will, common up to three years ago, has practically disappeared; and the king-bird, of which we have always had several pairs, has not appeared on our grounds this year. The grackles have markedly increased about the lake, while the red-wings have diminished. The purple martin disappeared from the city of Worcester, so far as I know, a year ago. I have talked with several good observers, none of whom has seen a single individual of this species this year. The mourning dove probably nested at the lake this year, as I have seen individuals occasionally during the spring and summer. This is the first time I have seen this bird for nearly twenty years. The spotted sandpiper has diminished. All birds have been pro-

ted from sparrows and cats, but not from grackles, crows, blue jays and other wild birds. I should say that numerically the birds were holding their own in that particular locality, but that individual species fluctuated, some years particular birds being numerous, while others which seem to be subjected to about the same perils are rare."

As an epitome of bird-life, and the contrasting conditions affecting it in the city and country, Dr. Woodward's report is noteworthy. The main causes of the decrease of birds in the city are exhibited, and the reduction of the birds in the city with their comparative abundance in the near-by country is made plain. In the one case the birds were subjected to city influences; in the other they were protected from them, and given opportunity for breeding. The results in the latter case are obvious. A notable effect of the June storms of 1903 is apparent in the diminution of tree swallows, the extermination of the martins, and, possibly, also in the decrease of the whip-poor-wills, red-wings and king-birds. The fluctuations of species from year to year may be owing to natural causes operative everywhere, or to the malign influences emanating from the city not far away. He offers no explanation, but states the facts. They form the text for a treatise on bird protection.

In the development of our civilization there have been evolved or introduced certain influences destructive to bird-life, such as trolley cars, improved firearms and the English sparrow. Taking such forces into consideration, together with the growth of cities, it is possible, perhaps, that we now have fewer of the smaller native birds in the State than forty years ago. Many of the larger species have been decreasing steadily. Along the coasts and in the densely populated regions, game birds, many shore birds and some water-fowl have lessened to such an extent that they are evidently doomed to extermination, unless better protected. So far I must agree with those who believe that our birds are being extirpated. But we must guard against too much pessimism. It is quite natural to remember the times in our youth when birds were very numerous, and forget the seasons when they were comparatively few. So one re-

members the cold winters and severe snowstorms of his childhood, and forgets the mild seasons. Similarly it seems, as we look back, that we had many tremendous flights of warblers in those days, but the records show very few.

Mr. Abbot H. Thayer of Monadnock, N. H., where many of the repressive forces which exist in eastern Massachusetts are almost unknown, who takes a very optimistic view of the matter, says that asking the public, or even so-called ornithologists, whether they find birds diminished, is as deceptive in its results as a look at the telegraph poles along a road. Just where the observer stands there is one pole or none, while a glance back down the road reveals a massed accumulation one against another, —all due to perspective. One's past, he says, is so well stocked with so many remembered sights of rare and beautiful birds that only a very philosophical mind can escape the impression that birds were formerly constantly in sight, whereas one really saw few in some seasons, as is the case to-day.

Lest the conditions in Massachusetts regarding the smaller birds might prove exceptional, and the results of the investigation misleading, the inquiry has been extended somewhat into other populous States of the Atlantic seaboard. The reports seem to indicate that with some exceptions the smaller birds are not generally decreasing in numbers in those States. Extracts from reports of some of the most competent observers are given below.

Mr. C. J. Pennock, ornithologist to the Pennsylvania State Board of Agriculture, says that birds are probably decreasing, but not to any great extent, except a few species. He mentions the dickcissel, purple martin, ruffed grouse and bob-white as species that have been decreasing for many years, and the house wren as increasing in his locality (Kennet Square, Pa.).

Mr. Frank M. Chapman, assistant curator of the department of birds in the American Museum of Natural History, writes from his home, Englewood, N. J.: "Birds remain about the same, except bobolinks, which have been exterminated locally; the larger hawks and owls, which decrease

with the disappearance of the woodland ; game birds, including doves and wild fowl ; cave or cliff swallows, which have disappeared locally as breeders ; and tree swallows, which are possibly less abundant as migrants."

President Theodore Roosevelt, who is an accurate observer of animal life, writes from his home on Long Island, N. Y. : " Here at Oyster Bay my observations have gone over thirty-one years. During that time I do not believe there has been any diminution in the number of birds, as a whole. Quail and woodcock are not as plentiful as they were ; I am inclined to think that last winter may have been hard on quail around here. But, on the other hand, there are one or two other wild birds that, I think, have increased in numbers." Later he wrote, in response to an inquiry regarding the shore birds : " During my time there have never been any but scattering shore birds in my neighborhood on the north shore of Long Island, and there are now as many of these as there ever were. During the same period there has been a great diminution in the shore birds, once so plentiful, in the Great South Bay on the south shore of Long Island ; as I happen to know, because my uncle lives there."

Mrs. Mabel Osgood Wright of Fairfield, Conn., says that, speaking locally for Fairfield and ten miles inland, some species have decreased, others have held their own. The great horned owl is nearly extinct. Wood ducks have become very rare within ten years ; also mourning doves ; scarlet tanagers and shore birds in general have decreased.

Mr. E. Hart Geer, secretary of the Connecticut Commission of Fisheries and Game, writes that shore birds have decreased greatly, and that river ducks have decreased every year. He says there was as good a flight during the fall of 1904 as was consistent with the " extermination due to unrestricted shooting."

Mr. Harry Hathaway writes from Providence, R. I. : " The shore birds, game birds, hawks and owls are decreasing in the State generally, but no appreciable decrease is occurring in other species, and some few species are increasing in numbers." He says that a fair estimate of the decrease of the birds named would be one-half in fifteen years, but that this may be too large, as his observations have been " locally

restricted." Hawks and owls have been driven off, he says, by the removal of their nesting sites. This was very evident after the coal strike in the spring of 1902, when much wood was cut. A law passed by the Legislature, offering a bounty on hawks, owls and crows, also has had some effect.

Mr. Abbot H. Thayer of Monadnock, N. H., writes: "Ever since Hornaday's announcement I have done my best to know the truth about this region. Now, nearly fifty years later than when I first knew Keene, N. H., every wet spot has the same red-winged blackbirds, . . . every mowing its bobolinks, and all the village birds are as abundant in a general way as forty-eight years ago. . . . I believe that the only species that have suffered any significant change are the passenger pigeon, upland plover and wood duck; also the ruffed grouse and the bobolink (as I am told, not as I notice here)." The upland plover he regards as nearing extinction, and the purple martin as occupying fewer bird-houses than formerly.

Dr. G. H. Perkins of the University of Vermont, entomologist of the Vermont State Experiment Station, Burlington, writes: "I think, on the contrary, many birds are increasing. Birds are well protected, and I think few are intentionally killed in the State. I should say there has been no decrease, as a whole. Going back fifty years ago, if accounts are to be trusted, the wild pigeon and some others were more abundant than of late. Swallows, swifts, song sparrows, robins, bluebirds, redstarts, vireos, white-crowned sparrows, bobolinks, many warblers, meadowlarks, downy and hairy woodpeckers and creepers do not seem to decrease, if not increasing."

Mrs. Elizabeth B. Davenport of Brattleboro, Vt., says that birds are not decreasing, as a whole. Grouse are reported less in number, the martins are decimated and the house wrens are sadly decreasing.

It is fair to conclude, from all the foregoing, that with the smaller species the natural balance of bird-life is now fairly constant in Massachusetts and the neighboring States, and that the decrease will be found mainly among those species that are most hunted.

It now remains to take up separately those families of

birds which are reported as diminishing in Massachusetts, that we may see what species most need protection. While it is difficult to get accurate reports regarding birds as a whole, those regarding particular species are more readily obtained. Such reports are the more valuable, as they indicate just where protection is needed.

BIRDS REPORTED AS DIMINISHING IN NUMBERS.

Family Podicipidæ. — Grebes.

This includes the birds commonly known as dippers, water witches, etc. This family and the one following seem to be of comparatively little economic importance so far as the farmer is concerned, as the birds composing them get their food almost entirely from the water. The pied-billed grebe undoubtedly once bred in suitable places about the inland bodies of water in this State; it is now known to breed in very few localities east of the Connecticut River. It has been driven away from at least three localities in Massachusetts in the last few years. It is still fairly common in the migrations on many of the ponds and rivers in the interior of the State, but seems to have decreased greatly on the rivers of eastern Massachusetts, where, although its flesh is of little value, it is pursued and shot whenever it appears. This grebe might have been able to dive quickly enough (at the flash) to escape the charge of the flint-lock gun, but with the modern breech loader at close range it has no chance. The horned grebe also probably once bred here, but is now seldom seen except in migrations or in the winter. Along the coasts the grebes are quite well able to take care of themselves, and, as they now breed mainly far to the north, where they are little disturbed by man, our three species seem about as common as ever on the coast in their migrations.

Family Gavidæ. — Loons.

Loons, no doubt, once bred commonly in the more retired ponds over a great part of the State. Thirty years ago they were not rare in the breeding season in the northern part of Worcester County, where they were observed to nest at different localities by Messrs. C. E. Ingalls and C. E. Bai-

ley. I am not aware that they now nest anywhere in the State. No doubt they would have been driven from the interior of the State long ago, had they not been well able to take care of themselves by diving. They are still to be seen in the migrations in most of the larger and more remote bodies of water, and seem to maintain their numbers along the coast, as does also the red-throated loon.

Family Laridæ. — Gulls and Terns.

Certain of these birds were once very abundant in the breeding season on Long Island Sound, and bred also in suitable islands all along the Massachusetts coast. Miss Katharine P. Loring of Prides Crossing, Beverly, writes that about forty years ago there were large numbers of "gulls" in spring at Gooseberry Island and Eagle Island off the Beverly shore, and that these islands were "covered with their eggs." The birds referred to were probably terns, or "mackerel gulls," as they are called locally. The Arctic and roseate terns are both recorded as breeding at Beverly and Ipswich as late as 1846 and 1869 respectively.* These terns, together with the common and least terns and the laughing gull, bred abundantly along our coast as late as the early part of the nineteenth century. They were gradually driven off the breeding grounds by eggers. In the decade before 1890 the demand for the plumage of gulls and terns for millinery purposes became so great that they were menaced with extermination. Mr. Geo. H. Mackay says that he has been informed that one party of gunners killed no less than ten thousand of these birds on Muskeget Island in one year. Since then Mr. Mackay, who was for years a member of the committee on bird protection of the American Ornithologists' Union, has succeeded in securing protection for the birds breeding on this and other islands, as a result of which they have increased enormously. He says that they are now more abundant than at any time for many years. The least tern, or sea swallow, however, which was formerly abundant, but was one of the chief victims of the milliners, has not, he says, shared in this in-

* "Birds of Massachusetts," Howe and Allen, p. 27.

crease, and is now comparatively rare. The herring gull probably once bred here, and still breeds on the Maine coast. This bird is as wary as a crow while here, and, if protected on its breeding grounds, it is likely to maintain its full numbers. It is seen here now mainly in fall, winter and spring. Probably no sea birds other than the laughing gull and the terns above mentioned now breed in Massachusetts, although gannets, cormorants and other species are seen along the coasts in migration.

Family Anatidæ. — Ducks, Geese and Swans.

This family contains a large number of beautiful and graceful birds, known generally as wild-fowl or water-fowl. They form collectively one of the most valuable natural assets of any country. Many species are unexcelled as food, and, if properly protected, they will continue an annual source of food or income to a considerable proportion of the rural population. Their presence on the waters or in their peculiar flight-formations adds a certain charm to any landscape. Their sonorous cries and calls speak of the freedom of the wilderness. Were they extinct, how we should miss the call of the wild geese in the spring, and the sight of their wedge-shaped flocks sweeping across the sky! Yet we are strenuously endeavoring to extirpate them. The wild swans are gone; only a few wanderers have been recorded as shot in the State during the last quarter of the past century; their occurrence here now may be regarded as merely accidental.

The Geese (Subfamily Anserinæ).—The lesser snow goose is probably the white goose that was once so abundant in Massachusetts Bay and on Cape Cod, according to the tales of the early settlers. It is now so rare as to be regarded as merely an accidental visitor, and I am not aware of any very recent capture of this bird in Massachusetts.

The Canada goose, although still a common migrant, has decreased in numbers within my recollection. Mr. Elbridge Gerry of Stoneham, who has been a market-hunter for nearly seventy years, says there were a hundred geese in his boyhood days to one now; and yet he believes that

more are being killed now than ever before, on account of the use of trained live decoys. This bird, though once breeding here, now breeds mainly north of the United States. According to Mr. William Brewster, it is now protected on its breeding grounds on the island of Anticosti. This island, some forty miles in length, is studded with numerous ponds, where the geese can now breed unmolested. This protection, together with the extreme wariness the birds have acquired, may account in part for their having held their numbers so well in their flights along our coast for the last twenty years. Fifty to seventy years ago the geese often flew very low over the country, and sometimes they alighted in pastures and corn fields; now they usually fly high, and seldom alight except on some sheet of water. Mr. Mackay believes that the Canada geese are not now decreasing at Nantucket.

The Brant goose, which was once remarkably abundant all along our shores, was very common some seasons in migration at Chatham and some other points on Cape Cod up to the latter part of the last century, but rare elsewhere. I am informed by Mr. Elbridge Gerry that Brant are now rare even there, in comparison with their former numbers.

These are probably the only three species of geese that were ever abundant in Massachusetts.

The Bay and Sea Ducks (Subfamily Fuliginæ).—Ducks are divided into three subfamilies, bay and sea ducks, river and pond ducks, and mergansers or sheldrakes.

The first subfamily, the bay and sea ducks, is composed of birds that find their food by diving. These birds breed mainly in the far north, where, excepting the eiders, they are not much molested. They can usually keep well away from the shore, and can escape the gunner by diving and swimming under water, as well as by flight. Most of them are not highly esteemed as food, on account of their fishy flavor, and for these reasons they have on the whole maintained their numbers better than any other ducks. One species, however, the ruddy duck, which habitually feeds in small ponds near the sea, has decreased very rapidly of late. They once bred in Massachusetts. Thirty years ago they

were very common migrants; now they are seldom seen. In 1878 I found them abundant in Florida; in 1899 I did not see a single bird there, though it was a good season for ducks of all kinds. They are now the object of special persecution, and have been for twenty years or more. Their price in the market has quadrupled. Unless something effective is done for their protection, they are likely to follow the species already extirpated. The scoters or surf ducks, called coots by the gunners, although perhaps decreasing slightly, appear to be nearly as abundant as they have been within the memory of people now living. Mr. Gerry says they are nearly as plentiful as ever along the coast; Mr. Mackay has studied the sea birds, wild-fowl and shore birds for many years. He has visited the Boston markets at least twice each week during the season, and carefully noted what birds were on sale there. He has spent much time on Nantucket and the adjacent islands, both in the shooting and breeding seasons. His opinion on this subject is therefore of the greatest value. He says that surf ducks and eider ducks seem to hold their own generally, especially about Nantucket. He believes the white-winged scoter has diminished very little. The American scoter he has never known to be plentiful, but apparently it has decreased to some extent.

The old squaw is still very common, and no decrease is noted by any one. Mr. Mackay regards it as very abundant. The bufflehead is still common along the coast, but has been driven out to some extent from many ponds and rivers in the interior, where it is not so common as formerly in the migrations. The golden-eye or whistler is also still common on the coast.

The greater scaup duck, blackhead or bluebill was once very abundant in Massachusetts waters. The scaup decreased rapidly off the Massachusetts coast, until they became rather rare a few years ago. Mr. Mackay, however, says they are now becoming common at Nantucket, and Mr. Hoffman rates them as common migrants.*

The lesser scaup, raft duck, little blackhead, or bluebill,

* "A guide to the birds of New England and New York," Ralph Hoffman, p. 299.

as it is known among the gunners, was once one of the most abundant of all ducks along the Atlantic seaboard. Ranging to middle or southern Florida in winter, it is exposed to the gunners all along the coast. It has decreased more than some other bay ducks,—perhaps for this reason. I found it in northern Florida in 1878, the most abundant water-fowl I have ever seen. At that time great “rafts” of these ducks, at least a mile in length, were seen on Indian River. When a boat approached one of these great masses of birds, those nearest the boat would rise and fly over the flock, making one continuous roar of wings as the boat approached. While crossing Lake George on a steamer, the remarkable spectacle was witnessed of a sheet of water dotted all over with these ducks as far as the eye could see. In 1899 in the same region there were still some large flocks, but I estimated that the birds had diminished fully 75 per cent. The lesser scaup is now growing rare in this State. Redheads and canvasbacks have never been recorded as generally common in Massachusetts. Mr. Mackay says that more redheads were seen at Nantucket in the winter of 1903–04 than for many years.

The Pond and River Ducks (Subfamily Anatinae).—Mr. Hoffman says: “Seven species belonging to this division occur regularly in eastern New York and New England. All but one, however, are now so rare that the ordinary observer will hardly come across them.”* This is indeed true in regard to Massachusetts. In the course of this inquiry only one observer reported these ducks as holding their own; all others reported them as decreasing. These birds may be distinguished from the bay and sea ducks by the fact that they do not dive for their food, but take their food from the bottom in shallow water by putting their heads under. They are more distinctly fresh-water ducks than the bay and sea ducks, and are more exposed to the gunners by reason of their feeding in shallow water and usually near shore. No doubt our ponds, marshes and streams once swarmed with these ducks during the migrations, and it is

* “A guide to the birds of New England and New York,” Ralph Hoffman, p. 301.

not improbable that some of them bred here, as the wood duck and black duck still do to some extent.

The wood duck, the most beautiful of all ducks, once bred abundantly throughout New England. In Massachusetts it has been growing rarer near the coast for years, but has been fairly common in parts of most of the inland counties until the latter part of the last century. In this inquiry no questions were asked regarding the wood duck, but information comes from Berkshire, Worcester, Essex, Middlesex, Norfolk, Plymouth and Bristol counties that this bird is rapidly decreasing, or gone. Fourteen observers speak of the bird as follows: extinct, three; nearing extinction, five; decreasing, three; decreasing until the last two years, one; holding their own, two. Some of these reports come from regions where the wood duck has always been a common bird. In other sections its absence has now ceased to attract notice. My own experience with the wood ducks seems to indicate that they are decreasing rapidly. A few years ago they were occasionally seen in small flocks during the breeding season; this year I saw but one in the migrations at Concord. This bird, a fine male, was comparatively tame, and I might have shot him on three different occasions. He was finally killed by a gunner. This species is not so wary as many other ducks. It often haunts small streams and ponds which can be shot across. Where gunners find a family of these birds, it is not very difficult for them to get every one. Mr. Edwin R. Lewis, one of the bird commissioners of Rhode Island, wrote me from Westerly, on Dec. 19, 1904, that wood ducks had been only occasionally seen that year, and that he knew of only ten of these birds having been killed during the season. In 1901 Dr. A. K. Fisher of the United States Biological Survey predicted that the wood duck and the woodcock would become extinct, unless better protected.* This prediction now seems in a fair way to be realized, so far as wood ducks breeding in Massachusetts are concerned.

The American widgeon or baldpate was formerly seen

* "Two vanishing game birds," A. K. Fisher, Year Book of the Department of Agriculture for 1901, published in 1902.

quite generally in small flocks on the interior waters of New England. It is now believed to be either uncommon, rare, or wanting everywhere in Massachusetts except possibly in the Connecticut valley and along the coast in some seasons ; but Mr. Mackay regards it as not uncommon on Nantucket.

The black duck has fallen off very much in numbers, but it is the only river duck that still may be regarded as generally common in the State. Mr. Gerry says that the number of black ducks seen now is about one-tenth of one per cent of the number that were here seventy years ago, and that they have been decreasing ever since that time. He says he killed sixty-six black ducks in two mornings in Spot Pond, Stoneham, about fifteen years ago, and that the ducks there are increasing now under the protection of the Metropolitan Park Commission, but that in the ponds outside of the park there are practically no ducks now. Black ducks leave the salt water at night, going to the springs for fresh water when the ground is frozen. They have been greatly decreased by night-shooting, but they have now become very shy, and usually hide in the reedy sloughs, or, when in ponds or on salt water, keep well away from the shore during the day. There seems to have been a slight increase of these birds within a year, and a good flight in some sections in the fall of 1904.

The mallard has been generally rare in the State for many years. Mr. Arthur Curtis Dyke of Bridgewater regards it now as being, next to the black duck, the most common there. Mr. Lewis reports an increase of mallards in 1904 in Rhode Island. The shoveler is very rare, and the gadwall also rare, although said to have been once not uncommon. The pintail may now be considered a rare bird in most of Massachusetts, where within thirty-five years it was commonly seen in small flocks. The blue-winged teal was a common migrant in the State up to within thirty years, being found in large flocks in the small ponds and streams. Mr. Gerry says that fifteen to forty years ago he killed blue-winged teal nearly every morning, in the season, at Spot Pond, which is only about seven or eight miles from Boston. He has seen about two hundred birds in a flock at Plymouth,

and has been informed that a boy killed eighty-four in one day within twenty years at Sandwich. Now the teal are nearly all gone, although there was a small flight in the fall of 1904. In September a flock of fourteen birds passed me three times on the Concord River. They were fired at several times, and that was the last I saw of them. I have not seen so many in a flock for years. Occasionally a small flight like this is seen in the fall, but very few ever come back in the spring. Mr. Mackay says that until 1904 probably not forty blue-winged teal have been seen on Nantucket in fifteen years.

Green-winged teal, Mr. Gerry says, were formerly very plentiful, but he has not seen one now for five years. In 1870 my predecessor, Mr. E. A. Samuels, regarded this bird as "quite abundant"* in the spring and autumn migrations in New England. Now it is rare, and seems to be going out. I have not seen one in Massachusetts for years. Mr. Mackay says it was formerly common but is now very rare.

The Mergansers (Subfamily Merginæ).—The mergansers, sheldrakes or fish ducks are still not uncommon, the red-breasted merganser being abundant off the coast in the migrations. These birds are expert divers, breed far north, and most of them do not go far south. They are well able to take care of themselves. The American merganser, goosander or pond sheldrake was formerly very common on ponds and rivers, and once bred in the State. It is still common in winter along the Connecticut. The hooded merganser, once, like the wood duck, very common, is growing rare, and is now the rarest of the mergansers.

Family Ardeidæ. — Herons.

It seems probable that herons are decreasing in many localities. Thirty-five persons report them as decreasing, twelve report them as unchanged in numbers, and five state that night herons are increasing. My own experience, together with that of others in whose judgment I have great confidence, seems to indicate that, in general, these birds are not now decreasing rapidly. The law passed in 1904 giving

* "Birds of New England," E. A. Samuels, p. 493.

them protection was no doubt necessary to their preservation, as their size alone dooms them to constant persecution.

The least bittern keeps very closely hidden in the meadows or swamps and is seldom seen by the ordinary observer. While it probably has been driven out of many localities by the draining of meadows, I hear its note in suitable places quite as often as I did when a boy.

The green heron has grown less common where boys or foreigners do much shooting; elsewhere it probably does not vary much in numbers, except where the trees or shrubs in which it breeds are cut away. In the localities which I have frequented this year, however, it has been less common than usual.

The American bittern was driven out of many of its breeding places last year. Breeding birds have disappeared from a certain locality in Wareham where they were formerly seen. This was probably due to shooting. On the other hand, they were more common along the river in Concord this year than last. On the whole, the bittern seems to be holding its own fairly well, excepting near the cities.

The great blue heron no doubt formerly bred abundantly in some localities in Massachusetts. In September, 1874, I saw what seemed to be a nest of this species in North Brookfield; but I know of no recent record of its breeding in the State, and it was probably driven out long ago.* It visits us regularly in the migrations, and takes care of itself so well that few except immature birds are shot. In my own experience this species has not diminished greatly of late, but I saw fewer birds this year than last. Many other observers, however, are very positive that the great blue heron is steadily diminishing in numbers, despite the law recently enacted protecting all herons at all times in Massachusetts. Mr. Gerry says they are few along the coast, in comparison with the numbers formerly seen. About thirty years ago he saw between thirty and forty at once feeding at Wellfleet.

* Since the above was written I have been told by Mr. J. A. Farley that a single nest of this species has been found recently in the State by Mr. C. E. Bailey.

The black-crowned night heron has certainly been driven out from three inland localities where I formerly knew it to breed. The birds were persecuted by egg-hunters and gunners, so that they were forced to change their breeding grounds nearly every year; and finally they were killed or scattered, so that these heronries exist only as memories of the past. The birds have persisted, however, along the coast, and some of their heronries are now protected. All other herons besides those mentioned above are regarded as accidental in Massachusetts.

Family Rallidæ. — Rails, Gallinules and Coots.

These birds, particularly the rails, are rather secretive, and ordinarily are seldom seen in this region. Their habits protect them. The gallinules are not known ever to have been common. The coots, the least secretive of the family, probably have decreased, while the rails seem to hold their own except where driven out by floods or the draining of meadows. They are probably overlooked by most gunners. Only a few observers report on them at all; these find them about the same as ever, except Mr. Edward A. Bangs, who says: "On occasional trips to the Sudbury marshes at Wayland it seems to me that the ducks, rails, herons, etc., have almost disappeared."

Order Limicolæ.

Shore Birds. — Only twelve of the forty-two species of shore birds known to inhabit the State or migrate through it can now be regarded as at all common. Three species are uncommon; fourteen, rare; and the rest merely accidental or casual. Most of those now considered common were formerly very abundant, as were also some which are now rare. Nearly all the larger species are now either uncommon, rare or casual. Some of them are nearly extirpated or driven off our coasts. A few of the accidental species never were common here, but the others probably were. The common smaller species have been saved from total destruction, some by their small size, which makes shooting them of little profit, and some by not consorting together in large flocks. For these reasons mainly,

perhaps, the "peeps" or smaller sandpipers, the smaller plovers and the spotted and solitary sandpipers now seem to hold their own very well, although the "peeps" and sanderlings were once very much more abundant than now. Turnstones are still not uncommon, both in spring and fall. The black-bellied plover, or beetlehead, a bird formerly migrating along our coast in enormous numbers, has decreased rapidly since the middle of the last century. In 1842 three men shot one hundred and twenty-one birds May 24, and one hundred and fifty May 25, on Tuckernuck Island. In 1870 a law was passed prohibiting the shooting of these birds in the spring migrations. The law was repealed in 1871, but afterward re-enacted, and since then the species has increased somewhat. Mr. Mackay says that never for the last fifteen years have there been so many of these birds as during the past two seasons, — 1903 and 1904; and that there is now a notable increase of young birds each fall. The golden plover has not benefited much by this law. The abundance of the Eskimo curlew and the golden plover is largely governed by the amount of spring shooting done in the Mississippi valley, as most of these birds come north by that route. "The golden plover is now practically eliminated from the east," says Mr. Mackay. This was once one of the most abundant of our migrating birds, coming at times in enormous flights, and fairly glutting the markets. Mr. Henry Shaw tells me that at one time, probably soon after 1860, a great flight of these birds swarmed over the fields south of Worcester, and that practically every man and boy in the place who could get a gun was out shooting them. There is no record of a single bird having been killed there since. Mr. Mackay says that only about a dozen golden plover were seen in the Boston market in 1904, up to September 16.

The killdeer plover is said by old gunners to have been common once on the coast, and occasionally plentiful in the interior and along the Connecticut River. Several observers confirm this. It was once not rare in some portions of Worcester County, and common in Berkshire County; it is now rare everywhere, so far as I can learn.

The long-billed curlew, or sicklebill, the largest of the

curlews, has not been common in migrations on the Massachusetts coast within the memory of old gunners. It is now merely casual. Mr. Mackay refers to it as follows: "Only rare stragglers left, less than half a dozen having been taken in Massachusetts in twenty years. Very few left in South Carolina, where they were formerly very abundant."

The Hudsonian or jack curlew was a very abundant species sixty-five or seventy years ago. "On Nantucket and Tuckernuck they were then shy, as now. They gradually decreased until about fifteen years ago. After that about one hundred and fifty birds appeared annually in July and remained through the summer. A few are killed each year, but the numbers remain about the same. They are the most common curlew now on Nantucket. They are much fewer now in the Boston market than in former years." (Mackay.)

The Eskimo curlew, or doughbird, was once an abundant migrant. This curlew is the most highly esteemed by epicures of all shore birds; for this reason it has been hunted incessantly whenever it appears. "About 1872 there was a great flight of these birds on Cape Cod and Nantucket; they were everywhere. Enormous numbers were killed. They could be bought of boys at six cents apiece. Two men killed three hundred dollars' worth of these birds at that time." (Gerry.) "Eskimo curlew, once common, have not been seen on Nantucket or brought into the Boston market as taken in Massachusetts (except an occasional bird) for a number of years." (Mackay.) "Almost extinct." (C. L. Perkins, Newburyport.) These birds are either nearly extinct in the east, or are avoiding our coasts in the migrations. Mr. Mackay says that the Eskimo curlew and the golden plover have dropped off 90 per cent in fifty years, and that in the last ten years 90 per cent of the remaining birds have disappeared. These two species almost invariably migrate together, and so are subject to equal decimation from gunners.

The Hudsonian godwit, or "goose bird," as it was called by the Massachusetts gunners, was once perhaps as abundant

as any of the larger shore birds on the coast. "This bird was as plentiful as any bird I ever saw at Ipswich sixty years ago. I have not seen one now for about thirty years." (Gerry.) It is now growing very rare, and, together with the marbled godwit, a famous bird of the olden time, is seldom seen now on our coast. "Practically none left of either species." (Mackay.)

Vast flights of the knot, or red-breasted sandpiper, used to roam this coast. Fifty years ago this bird was very abundant. "Now fallen off 98 per cent, and the red-breasted snipe or dowitcher is nearly in the same category." (Mackay.) "I have seen the redbreast at Orleans flying in clouds. My father killed two hundred in one day in 1848 at Nauset Harbor. I have not seen a bird now in fifteen years in the same places. The marsh snipe (dowitcher) used to be very plentiful at Ipswich and Wellfleet. I have not seen one for ten years." (Gerry.)

Previous to 1850, when the Cape Cod railroad was completed only to Sandwich, the knot was still a very abundant bird at Chatham, Nauset, Wellfleet and Billingsgate, Cape Cod. At the flats around Tuckernuck and Muskeget islands they were remarkably numerous. At this time the vicious practice of "fire lighting" prevailed. Two men together, one with a lantern and the other with a bag, would creep on the flocks at night. While one man dazzled the bird's eyes with the lantern, the other caught them, and, biting their necks to kill them, put them into the bag. *Six barrels* of these little birds taken in this manner were seen at one time on the deck of the Cape Cod packet for Boston. Barrels of birds which were spoiled during the voyage were sometimes thrown overboard in Boston harbor. The price of the birds at that time was but ten cents per dozen.*

The willet, or humility, as it is called along shore, one of the great tattlers, was probably one of the birds referred to by the early settlers, under the same name, as flocking on our coasts in vast numbers. "These birds were very plentiful at Wellfleet, and there were a good many at Ipswich, but lately

* "Observations on the knot," Geo. H. Mackay, Auk, Vol. X, January, 1893, p. 29.

they have been growing rare. I have seen several within five or six years." (Gerry.) "Sixty years ago the willet was abundant, and bred here. Fifteen to eighteen years ago a few were seen each season. Now they are gone; only an occasional straggler now seen." (Mackay.) "Nearly exterminated." (Perkins.)

The greater and the lesser yellowlegs are still fairly common in some seasons and localities, but they were once very abundant, and they are probably still decreasing in spite of the protection afforded them on some of their northern breeding grounds. "The lesser yellowlegs have fallen off on Nantucket 60 per cent in fifteen years, and the winter yellowlegs about the same. There also has been a considerable falling off in the number of these birds from Massachusetts sources in the Boston market." (Mackay.) The yellowlegs were the only shore birds reported as common in the flight in Rhode Island in 1904.

The Bartramian sandpiper, commonly known as the upland plover, a bird which formerly bred on grassy hills all over the State, and migrated southward along our coasts in great flocks, is in imminent danger of extirpation. Thirty-five years ago these birds bred commonly within the city limits of Worcester, about Fitchburg and in the country around and between those cities. A few still breed in Worcester and Berkshire counties, on Nantucket, and possibly elsewhere in the State, so that there is still a nucleus, which, if protected, may save the species. Their former abundance is shown by some of the statements of the older gunners. "When I was a boy, nine years old, my father killed ninety upland plover in one day. He killed sixteen without picking one up." (Gerry.) This was about seventy-five years ago, in the days of muzzle-loading guns. "Breeding birds, or those living on Nantucket, have fallen off 66 per cent in the last fifteen years." (Mackay.) "Upland plover extinct here from hunting, but breeds sparingly in northern Worcester County." (W. S. Perry, Worcester.) Five reports from localities where this bird formerly bred give it as nearing extinction, and four as extinct. This is one of the most useful of all birds in grass-land, feeding largely on

grasshoppers and cut-worms. It is one of the finest of all birds for the table. An effort should be made at once to save this useful species.

The pectoral sandpiper, or grass bird, formerly wonderfully abundant in the fall migrations on the salt marshes and meadows by the sea, has been common until very recently, and was abundant occasionally up to within about twelve years ago, when I last followed the marsh birds. I have been somewhat surprised to hear from Mr. Mackay that this species is no longer common in migration. He says they seem to have almost disappeared. A few are seen occasionally in bad weather. Mr. Gerry says he has not now seen a good flight for about ten years. He also says that the last really good marsh shooting he had in Massachusetts was about thirty years ago. He left the hotel at Wellfleet at noon in a carriage, accompanied by Mrs. Gerry; he fired twenty-three shots, killed sixty-seven birds, mainly beetle-heads, jack curlews and willets, and was back at the hotel at 4.30 P.M. Mrs. Gerry held the horse and kept tally of the shots fired. There is no difference of opinion in regard to the diminution of the shore birds; the reports from all quarters are the same. It is noteworthy that practically all observers agree that, considering all species, these birds have fallen off about 75 per cent within twenty-five to forty years, and that several species are nearly extirpated.

Snipe and Woodcock. — The Wilson's snipe is one of the most "shot at" birds of the American fauna, and, considering the amount of ammunition that has been expended on it, it has not decreased in numbers so much as might have been expected. Nevertheless, far fewer birds are now seen in Massachusetts in spring and fall than formerly were found in our meadows at those seasons. There is a legend in Concord, told me by Mr. William Brewster, that years ago a certain gunner won, in a few hours, a wager that he could kill fifty snipe with a limited number of shots on the Concord meadows. There is much shooting done there now, but each gunner gets comparatively few birds.

The woodcock formerly bred abundantly in small swamps and alder runs throughout the State. Thirty years ago it

bred in all suitable places about Worcester, but within ten years from that time the breeding birds were shot off. Mr. Gerry has kindly lent me a memorandum book kept by his father, Col. E. Gerry, in 1838. He tells me that the woodcock recorded in this book were shot about Stoneham. Colonel Gerry commenced to shoot woodcock in July, therefore the birds shot must have been those breeding in the locality. On July 7 he shot twenty-two, for which he received only two dollars and seventy-five cents; on the 8th he shot and sold forty-two; on the 9th, nine; on the 16th, twenty; on the 21st, six; on the 22d, twelve; on the 23d, fifteen; on the 27th, eight. On the 11th he shot twenty-seven "birds," probably woodcock, by the price. These woodcock were sold in Boston at twelve and one-half to twenty-five cents each. After the first of August the score of woodcock shot falls off rapidly. Here are one hundred sixty-one resident woodcock, young and adult birds, killed by one man close to Boston in July. There were no doubt many other shooters operating about the city. No wonder that breeding woodcock disappeared rapidly from the region near Boston. The woodcock is decreasing all over its range in the east, and needs the most stringent protection. Of thirty-eight Massachusetts reports, thirty-six state that woodcock are decreasing, rare or extinct, while one states that they are holding their own, and one that they are increasing slightly since the law was passed prohibiting their sale. These reports refer mainly to birds breeding in Massachusetts. In the fall of 1904, in a few sections, there was a good flight of birds from the north.*

Family Tetraonidæ. — Grouse and Partridges.

Mention already has been made of the bob-white or quail, our only representative of the partridge family, as a sufferer from the effects of the winter of 1903. Another severe winter followed the hunting season of 1904, and the quail now needs more protection. The heath hen, formerly common over much of New England and the middle States, has been extirpated everywhere within the last century except

* Since the above was written reports of an increase of breeding birds have come in from Worcester and Middlesex counties.

in Martha's Vineyard. Dr. J. A. Allen says that prairie chickens were introduced there,* but, if so, they have probably died out as they have in other places in the east. The heath hen is a hardy bird, and possibly might be propagated, and, under protection, restored to our woodlands.

The ruffed grouse, or partridge, the king of all our game birds, has decreased greatly in numbers over most of the State within the last half-century. No doubt there are gunners who kill nearly as many birds now as were killed by individuals fifty years ago, but those who do this do it by covering a great deal more ground than was necessary then, and they are merely bringing the birds nearer to extermination. The decrease is estimated at from 50 to 75 per cent. Forty-six observers report the grouse as diminishing in numbers, three say grouse are holding their own, while only five report an increase. The species is extremely hardy, and, naturally, its increase is affected by only the most severe and unusual inclemencies of the weather.

Family Columbidae. — Pigeons and Doves.

The wild, or passenger, pigeon, once so abundant here, is now practically extirpated. It is of interest to note a recent report of the occurrence of the passenger pigeon, which seems to be authentic. Mr. Clayton E. Stone of Lunenburg reports seeing a flock of twenty-three birds there on May 6, 1896. Another instance is mentioned in the report of the Massachusetts Fish and Game Commission for 1903.

The mourning dove is reported as decreasing, rare or extinct by thirty-nine observers; a few others report it as wanting in their localities, or as unchanged in numbers. These reports come from every county in the State except Dukes, Nantucket and Franklin, from which no report on this bird has been received. The only cases of increase are reported from Bristol and Worcester counties. Miss Agnes G. Barnes of Plymouth says the species is increasing, after almost total extinction. Miss Abbie Churchill of Fitchburg says the bird has been seen recently "for the first time" at Fitchburg. Col. J. E. Thayer says the doves are increasing at Lancaster, and S. F. Stockwell says they are scarce but

* "Memorial history of Boston," Vol. 1, p. 12.

increasing at Millbury. I have seen rather more of these birds than usual in Middlesex County this season, but from the reports it seems probable that the species is in some danger of extirpation. As against the encouraging reports from Worcester County, there are eight pessimistic ones from the same county.

Family Bubonidæ. — Horned Owls, etc.

Thirty observers report owls as decreasing, ten report them as unchanged in numbers, three report an increase. The increase is reported only from Franklin and Berkshire counties. The decrease is most marked in Worcester and the eastern counties, but there are four reports of decrease from Berkshire County.

While the larger owls appear to be decreasing generally in eastern Massachusetts, and breeding great horned owls have disappeared from many sections, the screech owl is still locally common.

Family Falconidæ. — Eagles and Hawks.

This family has been long regarded as decreasing in eastern Massachusetts, and the present inquiry confirms that impression. Twenty-eight persons report eagles as decreasing, and most others report them as very rare, or even nearing extinction. Mr. W. R. Stearns of Pittsfield, Berkshire County, however, says that he sees a slight increase in the number of eagles there. The golden eagle is very rare, but has been noted occasionally within twenty years. The bald eagle is not rare at some localities along the coast, especially in Plymouth and Barnstable counties; but old gunners say that it is not nearly so common as years ago.

Hawks are reported as generally decreasing by thirty-seven observers; others report them as rare; seventeen, as in usual numbers; but thirteen note an increase. The reports of increase come mainly from Berkshire, Hampshire and Franklin counties; some come from the outlying towns of Worcester County. Only five observers east of Worcester County see any increase in the number of hawks, and these are from the more remote towns. East from Worces-

ter County thirty-one report a decrease; west from Worcester County six note an increase and four a decrease. The reports seem to indicate that hawks, especially the larger species, while on the whole diminishing in eastern Massachusetts, are at least holding their own generally in the western counties, except perhaps in Berkshire, where the correspondence indicates a falling off in some sections. The reports are not detailed enough to enable many comparisons to be made as to the relative scarcity of the species, but the red-tailed hawk seems to have fallen off as much as any. On the other hand, the red-shouldered hawk, while decreasing locally, seems to be holding its own in many localities, and even occupying more territory than formerly. This seems to indicate that it is, in a measure, taking the place of the redtail in the breeding season in the eastern part of the State, where the former is growing rare. The marsh hawk seems to hold its ground fairly well in south-eastern Massachusetts and also in some other parts of the State.

Family Corvidæ. — Crows and Jays.

Crows are reported to be diminishing by only four observers and increasing by eighteen. Eleven of the latter come from west of Worcester County, which may indicate that crows are increasing somewhat in the western counties, as those making reports from that region are much fewer than those from the eastern part of the State. The blue jay, while decreasing locally, seems generally to hold its own.

Most of the birds, other than those already reported on, are such as are generally included by our law-makers under the head of

SONG AND INSECTIVOROUS BIRDS.

After careful study of the detailed reports received on many species, it is impossible to escape the belief that certain of the smaller birds have decreased in, or disappeared from, some densely populated regions. It is quite evident that, in some cases, a recent diminution in numbers was caused by the unfavorable weather conditions of 1904, and that, had it not been for this cause, no decrease would have

been noted. Wherever enough reports regarding any family or species have been received to warrant drawing conclusions, they will be given.

In regard to the cuckoos, kingfishers and woodpeckers there is not sufficient evidence on which to base anything more than an assumption that they are in general maintaining their former status. The northern flicker, gaffer woodpecker, high-hole, pigeon woodpecker or "wood pigeon," is believed by some to be diminishing rapidly, and this is probably true in some localities, but generally its numbers are being well maintained. Twelve observers report it as diminishing; twenty-four, as holding its own; and twelve, as increasing. Four of the reports showing a decrease are from south-eastern Massachusetts, and the cause attributed is the hard winter of 1903-04. Six of the others came from regions in Middlesex County where the birds probably have decreased from palpable causes.

Family Caprimulgidae.

The Whip-poor-will and the Nighthawk.—Six reports mention a recent sudden decrease or an absence of the whip-poor-will, which may or may not be a result of the June storms of 1903; but there is much evidence that the nighthawk has been diminishing for years in certain sections. Twenty-four observers report it as diminishing, very rare or absent, where it was formerly common. Seventeen see no change in their localities, but only eight report the bird as increasing or abundant. The decrease is reported from Berkshire, Franklin, Hampshire, Middlesex, Norfolk and Bristol counties, which comprise much the greater part of the State. In Essex County the species seems to be holding its own, or in some cases increasing. We have Barnstable, Nantucket and Dukes counties yet to hear from. In some localities in all parts of the State nighthawks seem to be holding their own; but the evidence of competent observers seems to agree, in the main, with my own experience,—that they are decreasing over large areas. Mr. William Brewster, who has kept careful records of the number of birds seen and heard, says that nighthawks

have been decreasing for years in the region about Cambridge and Concord. Mr. C. E. Bailey reports them now as growing rare in those sections with which he is familiar. The evidence from portions of south-eastern Massachusetts, as well as many regions in the western counties, seems to indicate that these birds are now generally rather uncommon there. A large part of Worcester County, however, seems to be well supplied with them. It is impossible to make any accurate statement of the areas in which they have decreased without a careful canvass of the whole State.

The Meadowlark and Bobolink.—It is quite generally believed that the meadowlark and bobolink have diminished because of the early cutting of the grass in fields and meadows since the general introduction of mowing machines. Where the grass is cut in June, the eggs or the young of these birds, even if escaping injury by the machine, are exposed to the heat of the sun and the attacks of their enemies. This inquiry gives some evidence of a decrease of these species, but not so much as might have been expected. Thirty-six observers report meadowlarks as decreasing; eighteen, as unchanged; twenty-three, as increasing. The reports of decrease come mainly from Berkshire, Hampshire, Worcester, Norfolk and Bristol counties. Indications of a recent decrease appear in a portion of Barnstable County. The reports of the birds holding their own come mainly from Middlesex and Franklin counties; while the reports of increase seem to be local and nowhere general, as they are scattered through all the counties except Norfolk, Barnstable, Dukes and Nantucket. All this seems to indicate a general decrease in only Hampshire, Worcester, Norfolk and Bristol counties, and even in these counties it is by no means universal.

Only fourteen reports are made upon the bobolink; twelve report it as decreasing or becoming very rare, and two as increasing. This bird is probably diminishing in Massachusetts, but, as most of the reports are from Middlesex and Worcester counties, it is impossible to tell how general the diminution has become.

Family Hirundinidæ.—The Swallows.

Even previous to the injury done by the destructive rain storms of June, 1903, it seems probable that the swallow family was represented by far fewer colonies and individuals in Massachusetts than it was thirty to forty years ago. Many observers have seen a decrease in some species within ten years. Some report a gradual decrease of all species, while comparatively few report an increase, except of the tree swallow. This species was greatly diminished in the winter of 1895 by a cold wave in the south, and since then has been recovering its numbers, which may account for the increase noted locally. Twelve observers report an increase of the bird, eighteen report numbers unchanged, and thirty-two report a decrease. The increase comes mainly in Hampden, Franklin and Berkshire counties. Although some persons in these counties report this swallow to be decreasing, the reports of decrease are distributed generally among all the counties on the mainland.

Eleven observers report an increase of barn swallows, twenty-one report that their numbers are as usual, and forty-one report a decrease. Franklin is the only county in which the reports of increase outnumber those of decrease. In this county also and in Middlesex and Essex counties there are the greatest number of reports that the bird is holding its own. From Middlesex there are nine reports of a decrease, but also eight that the numbers have not changed. Two report an increase. All reports from Suffolk County indicate a decrease, as might be expected from the accession of population; but the same is true of Plymouth County, where there are few cities.

The cliff swallow or eave swallow is reported by only eight observers as increasing, as holding its own by sixteen, and decreasing or extinct by thirty-two. Most of those who find the cliff swallow decreasing agree that this has been going on for twenty to thirty years. This bird was originally a native of the west, where it built its mud nests on cliffs overhanging rivers. Its eastern movement, which began in the time of Audubon (when it followed civilization

eastward, nesting under the eaves of the settlers' buildings), ended probably about 1850. At that time these birds had established colonies over a large part of New England, and were very abundant in the farming communities of Massachusetts. Soon after the introduction and spread of the English sparrow they began to decrease, and have diminished until their colonies in the eastern part of Massachusetts are now much fewer than formerly. So many reports have come in of the abandonment of nest sites and so few of the establishment of new colonies that one can only wonder where the birds have gone.

The reports from Plymouth and Bristol counties seem to show that bank swallows are decreasing, as all observers who report at all on this species regard it as diminishing. The reports from the other counties are not so definite, except from Essex County, where they are now said to be increasing.

In my special report published last year the following statement was made: "It has been said that there are no bank swallows in Essex County."* This statement was published on the authority of a friend, who made rather an exhaustive canvass of the county about 1895, and found that the breeding birds had disappeared from all localities where they were formerly known, so far as he could learn. The published statement brought information from three different parts of the county, showing that bank swallows are still breeding there, and increasing rather than diminishing. While the evidence regarding the entire State seems to indicate a rather general decrease of these birds, it is not so convincing as in the case of either the barn or cliff swallows. In looking over all the evidence, it seems as if these two species have decreased most in the eastern part of the State, while the purple martin has, up to 1903, decreased most in the western counties. On the whole, the evidence of competent observers agrees with my own observation, which indicates that breeding swallows have been diminishing gradually for thirty years, although they still hold their own in many localities.

The only other significant or progressive decrease of a

* "Agriculture of Massachusetts," 1903, p. 479.

species as shown by these reports is that of the house wren. Five observers report an increase, eight report the numbers unchanged, and thirty-eight report the birds as decreasing, becoming extinct, or absent in the breeding season. When it is considered that these reports come mainly from localities where the house wren was once common, their significance is apparent. Thirty or forty years ago the bird was found about many of the cities in Massachusetts; now it is rarely seen. It seems to be decreasing in every county on the mainland. In my own experience this bird has become rare or wanting, within thirty years, in nearly every locality where I once knew it to be common.

There is some evidence that the red-headed woodpecker was common locally at one time. The Rev. T. B. Forbush told me in 1870 that it was common about Westborough, Worcester County, up to about 1830. He knew the bird well, and identified it at sight. Mr. J. M. VanHuyck of Lee, Berkshire County, writes that the red-head was once common there, and that a pair formerly nested in a hole in an old balm-of-gilead tree on his farm. A pair was reported to me as breeding in Worcester County in 1878, but I had no chance to verify this, as both birds were shot by a collector.

The wood thrush is markedly decreasing in some localities, but this is fully made up by its increase in others. Warblers generally appear to be decreasing in Plymouth, Bristol and Barnstable counties and parts of Worcester County, but the decrease may be mainly due to the weather conditions of 1903. Taking the State as a whole, the reports of increase and decrease are quite evenly balanced. The same is true of the thrush family; eighteen report an increase, fourteen no change, and seventeen a decrease.

The rose-breasted grosbeak is reported as increasing in thirteen different localities and as decreasing in only two. From my own experience, and from comparing notes with others, I have come to believe that this bird has been increasing and spreading slowly in Massachusetts for about forty years. It seems now much more common and generally dispersed than it was thirty years ago. It seems to have

adapted itself to changing conditions, and has come out of the woods and into the villages more than formerly. Whether the advent and increase of the Colorado potato beetle, on which it feeds, has had anything to do with this, is, perhaps, worth investigating.

Some observers report an increase of the scarlet tanager, but others report a decrease, and the account nearly balances. My own impression is that this bird was not so common thirty years ago as now, but it fluctuates in numbers from year to year. A few species beside the rose-breasted grosbeak evidently are increasing. Forty-four observers report the robin as increasing; four, no change; and seven, decreasing. A similar though less marked increase is reported of the bluebird and song sparrow.

THE CAUSES OF THE DECREASE OF BIRDS.

In considering the causes of bird destruction, as mentioned in these reports and letters, it becomes evident that *man* and his works are of the most importance. Beside man all other destructive forces dwindle into insignificance. The destruction of birds by the elements or by their natural enemies is not to be compared for a moment with that inflicted by man on all species that come within the scope of his wants. Man's persecution is annual and perennial. It gives a species no chance to recover. It seldom stops short of extermination, unless restrained by stringent laws efficiently enforced.

Man the Exterminator.

The reports on the diminution of bird-life, as caused directly or indirectly by man, may be tabulated as follows to show the relative importance of each cause:—

CAUSE.	Number of Observers reporting.
Sportsmen, or "so-called sportsmen,"	82
Italians and other foreigners,	70
Cutting off timber and shrubbery,	62
Market hunters,	57
Bird shooters and trappers,	32
Egg collectors, boys and others,	32
Milliners' hunters,	18
Draining marshes and meadows,	17
Gun clubs and hunting contests,	16
Telegraph, telephone and other wires,	3
Electric or trolley roads,	2
Railroads,	1
Automobiles,	1
Telephones,	1

The man "behind the gun" is, of all men, the most destructive to birds. The shooter, therefore, must head the list.

Sportsmen and Market Hunters.—Sportsmen and "so-called sportsmen" are given the chief place as bird destroyers. The number of observers who report them as such is considerably in excess of those who name market hunters. This is rather surprising, until we consider the increase in the number of sportsmen in the past fifty years.

Every city now has its gun club or sportsman's club, and so have some towns. The members practise to obtain proficiency in shooting on the wing. Even the boys have clubs of their own, in some places, where they practise at trap-shooting. Forty years ago there were comparatively few good wing shots. Since the invention of the glass ball and

clay pigeon they have become a legion. The number of trained setters, pointers and retrievers also has increased greatly. Mr. H. R. Packard of Attleborough writes that there are at least seventy-five hunters provided with bird dogs now, where there were only three bird dogs in the town thirty years ago. A man who knows very little of the habits of the birds can find birds with a dog. A well-trained dog enables the sportsman to find and follow birds to the death when once started.

The improvement in modern firearms renders the sportsman of to-day far more dangerous to the birds than was his great-grandfather with the uncertain flintlock. In olden times the sportsman must do the best he could with his single shot (when the gun did not miss fire). Then came the percussion cap, the double gun, the breech-loader, the "pump gun," and now we have the rapid-firing automatic gun. With this a passing flock can be followed with a perfect rain of shot. The association of sportsmen into clubs facilitates the general spread of knowledge about favorable covers or stands. No sooner are game birds plentiful anywhere, than the newspapers publish the fact for all the world to read and profit by. Railroads widely advertise all places along their routes where game can be found. Hotel keepers publish the advantages their neighborhoods afford to shooters. The telegraph and telephone carry to the cities the news of the arrival of flights of birds. The railroads, steamboats and trolley cars convey the shooters immediately to the spot.

Let us see how these various agencies work in the destruction of shore birds. A flight of birds is seen some day on the shores of Cape Cod. This news is immediately telephoned to Boston. The favored ones get it, and that night the trains take them to the ground. The next morning they join with the local gunners in what is virtually an attempt to kill every bird. If the daily papers publish the news, every gunner who reads it can take advantage of the opportunity, and be on the ground within twenty-four hours. When the ducks and geese are flying, men go and live in brush houses built at the ponds, or conceal themselves

in blinds, or follow the birds in boats. The deadly "pump gun" makes it almost impossible for a flock to get safely by a good shot. In the winter of 1900-01 I observed some modern duck-shooting in Florida. The members of a certain shooting club that had bought a large tract of marshes were accustomed to lie in blinds in favorable localities, where they shot so many ducks that they could not possibly make use of them. These ducks were kindly given away to people who lived in a region within twenty miles of the clubhouse. A sportsman occupying a blind and putting out his decoys would have men in boats to go about and start the ducks, that they might be attracted to his decoys. I am credibly informed that at least one of these gentlemen had several "pump guns" in his blind, with a man to keep them loaded, and, being a very quick and accurate shot, he was able, once at least, to kill in this way over one hundred ducks in less than two hours. Such shooting as this is probably exceptional. It only shows what can be done toward exterminating the birds by the modern sportsman, using modern methods, and without the effort of stirring from his tracks. There are many sportsmen, of course, who will neither practise nor countenance such slaughter; but there are too many gunners who, like the market hunter, are out to kill as many birds as possible. Market hunters are still numerous, but are probably not increasing greatly in numbers, for game is becoming too scarce to make hunting very profitable, even at the high prices now paid; and the law in Massachusetts now (1904) forbids the marketing of the grouse or woodcock. A large proportion of the market hunters are law-abiding citizens, and will not shoot much unless they can sell their birds legally; but there are some who will kill birds at any season, and sell them to epicures, hotels and road houses.

Hunting Contests.—Hunting contests or side hunts are still indulged in by many gun clubs. While these hunts may be conducted within the law, the spirit of the contest is wrong, for each contestant strives to kill as many birds as possible, that his own side may win, and that the other side may pay for the dinner which is to follow. Barrels

of birds and game have been killed in these hunts. Nothing tends more to exterminate the birds and game than these contests, and, the contestants being out to kill all they can, some are sure to kill birds other than game birds. All large birds and many small ones suffer. This association of hunters in rivalry to kill game is a blot on the history of civilization. It goes beyond the rapacity of the savage. The native Indians expressed disgust when they first saw the white men engaging in this kind of slaughter. It should be prohibited by law.

Italians and Other Foreigners. — So long as there are shooters, all large birds, whether game birds or not, are doomed to endless persecution, merely because they make good targets. Herons, hawks, owls, eagles and crows are shot at sight, whenever opportunity offers, and those that escape do so only by superior cunning and agility. Some of our hawks and owls are certainly among the most useful of all birds, but this group suffers particularly at the hands of the sportsman or gunner, because some hawks and owls kill some of the game. Farmers and poultrymen shoot them also.

A comparatively new element of danger to the smaller birds, and, for that matter, to all birds, is the fast-increasing horde of foreigners, mainly Italians, who come here from their native lands to engage in contract labor. Most of these men seem to be sportsmen, hunters or trappers in their way, but they regard everything that wears fur or feathers as game. These people go out in small parties, most of them armed with guns, and, in some cases at least, shoot at nearly every living thing they see. I have been told that if so much as a song sparrow gets up, the whole party shoots at it. Some of these gentry came into my yard in Medford in 1895, and shot a pair of bluebirds that were nesting there. The birds are not shot for profit, for their little bodies will not pay for half the ammunition fired at them. They are shot for sport, and it is said they are afterwards eaten. These people also trap and net birds. Several of them have been arrested in the Middlesex Fells Reservation with live birds in baskets, which they had

caught by means of twigs covered with bird-lime. Blue-birds, orioles, thrushes, purple finches and bobolinks are favorites with these trappers, who take them for export as cage birds. Most of the birds do not live to reach Europe. Three persons speak of a decrease of purple finches and one of a decrease of bobolinks from this cause. Mr. C. J. Maynard of Newton writes: "The purple finch is fast going. I have not seen over twenty this year. Cause, possibly trapping." He speaks of some cases of trapping which he knew of. As the purple finch seems to be holding its own at a distance from the cities, the inroads made on them by trappers near Boston and other cities in eastern Massachusetts may account for a local decrease there. A good trapper provided with decoy birds will soon have most of the male birds in a neighborhood, and some of the females. This trapping is not wholly confined to foreigners, but no one else seems to use bird-nets.

Mr. Wm. N. Prentiss, a deputy of the Massachusetts Fish and Game Commission, writes from Milford, Worcester County, that one of these people had a net, seventy-five feet long by six feet high, stretched where robins and other small birds came to drink and feed, which had probably "destroyed hundreds of birds," before he was arrested. Italians and Greeks are the people principally complained of. This shooting and trapping by foreigners is general. Complaints on this score came in as follows: from Berkshire County, eight; Hampden, six; Hampshire, two; Franklin, two; Worcester, fourteen; Middlesex, twelve; Essex, nine; Suffolk, four; Plymouth, two; Bristol, two; Norfolk, six; while two report it from the State in general.

This is the greatest danger which now threatens the smaller birds of Massachusetts and several other States. Mr. H. S. Hathaway of Providence, R. I., writes: "This fall there have been numerous complaints of foreigners shooting song birds." Complaints of this sort are coming from most of the Atlantic States. In the South Atlantic and Gulf States, foreigners and natives, especially negroes, shoot small birds in winter for the market. Unless we protect them here on their breeding grounds from this Euro-

pean invasion, their numbers must soon diminish, as has already happened in some parts of Italy and other Mediterranean countries.

Boys with Guns. — Boys with guns are about as destructive to small birds as foreigners. The "air rifles" and other guns, given as premiums by boys' papers, soap manufacturers and others, slay their thousands. Dwight Whiting wrote some years since, in "The Country Gentleman," that one boy's record for his air rifle was four hundred and seventy song birds. Several of his companions had done better than this. They had no use for the birds, and were only shooting for a record. The numerous advertisements of boys' guns show that they meet with a ready and profitable sale. When a boy is out with a gun looking for legitimate game, and does not find it, he will shoot something else; and so long as boys are allowed to carry loaded guns, the small birds are sure to suffer. Very few boys know the game laws. Most of this shooting is illegal, and the boys should be arrested. Miss Juliet Porter writes from Worcester that boys there are shooting English sparrows and other native sparrows, confounding one with the other. Such mistakes will always be made if boys are allowed to carry guns of any kind.

Milliners' Hunters and Taxidermists. — Those who write of milliners' hunters destroying birds seem to refer mainly to the past, as the demand for the plumage of native birds does not now warrant people in taking the risks incurred by breaking the laws to obtain them. This was once a very serious evil in the case of the gulls and terns, and from 1870 to 1880 it was a menace to such birds as orioles, tanagers and bluebirds; but shooting of small birds for this purpose probably never became general enough in Massachusetts to do very serious harm. My correspondence on this subject indicates that very few men are now hunting in this State to supply milliners.

Complaints are made that naturalists or taxidermists shoot the rarer birds. No doubt this is true, but it is usually illegal, as very few persons now have permits for scientific collecting. Whenever such conspicuous birds as the cardinal

or mocking bird establish themselves so far outside their usual range as Massachusetts, enthusiastic young naturalists are very likely to secure them. Such shooting possibly may prevent the gradual extension of a bird's range.

The rage for collecting birds' skins and eggs, which was so prevalent among school boys years ago, is believed to be largely a thing of the past. Taxidermists and dealers in birds' eggs generally report a very small demand for birds' eggs and skins. Many of the students are now studying the lives of the birds and following them with the opera glass, instead of the gun. Nevertheless, Mr. T. L. Burney of Lynn says that the kind of nature study taught in many schools results in a tendency to rob birds' nests. He speaks of two boys being arrested for robbing nests, who said their companions were doing the same thing. He also said he met, in the woods, many children who were interested in birds, and said they hoped to get a collection of eggs. Such children usually do not know that this kind of nature study is an infraction of the laws of the Commonwealth, punishable by arrest and fine.

Trolley Roads, Automobiles and Launches. — The cheap transportation from city to country offered by the trolley roads affords hunters, boys and foreigners an opportunity to reach distant fields and woods, and so spreads the baneful influences of the city over a much wider radius than ever before. Foreigners and boys swarm into the country, and practise with their cheap firearms on all animated nature, from the slow-moving turtle and the frog to the farmer's fowls or cattle.

While the poor man takes the trolley car, the well-to-do or rich take the automobile. The automobilist, with the long-range, small-bore rifle, has the advantage over all the others in killing any creature that can be shot while stationary. The "auto," unlike the horse, will stand quietly for the shooter. Farmers say that shooters in "autos" are killing everything of any size within rifle range of the roads. Mr. C. E. Bailey says that he believes they have killed most of the hawks that were formerly to be seen sitting on dead trees along the roads of the country over which he travels.

The gasoline launch is a potent factor in the killing or driving out of the ducks along our coasts and rivers. It is used illegally to get within range of the bay ducks, and its constant use in the rivers of the eastern counties frightens the ducks away from their former haunts.

Telegraph, Telephone and Trolley Wires. — The wires of telegraph, telephone and trolley companies annually cause the death of hundreds if not thousands of birds, which fly against them in the night or even by day. I have had many woodcock brought to me that had been killed in this way. Mr. George M. Poland of Wakefield says that many woodcock and rails are killed thus. Grouse are also killed by these wires, and by wire fences against which they fly; while the number of the smaller birds that are killed by trolley wires would probably be astonishing if it could be known.

*Lighthouses and electric light towers destroy thousands of birds, which fly against them during nocturnal migrations.

Man also contributes to destroy and drive away birds by introducing creatures which molest or kill them. Such are the introduction of the mongoose into Jamaica and other islands, and the importation into this country of the domestic cat and dog, the English sparrow, the house rats and mice, and possibly that of the starling and pheasant. These will be considered under the head of natural enemies.

Cutting off Timber and Undergrowth. — The greatly increased demand for pine lumber brings in the portable saw-mill, one of the chief contributing causes to the diminution of hawks, owls, grouse, and all birds which breed, or seek cover, in a heavy pine growth. Mr. Prentiss says: "A man who is a good shot can now, with a dog, follow and kill nearly every bird he flushes; while formerly at least 60 per cent of the birds flushed in a day's hunting would take to the heavy growth of pine, and escape at least for that day." Everywhere I go in eastern Massachusetts the white pine is being cut off. Thousands of acres were cut in the State last year. The demand is everywhere increasing. The great storm of November, 1898, uprooted acres of large pine timber in Plymouth County. Then came the coal strike

of 1902, which caused the cutting of many acres of wood of all kinds. This, in addition to the regular demand for pine timber, has caused the destruction, says Mr. A. C. Dyke, of many of the favorite nesting trees of the larger hawks. Cutting pine timber drives out birds which, like the black-throated green warbler, nest there. Where these pines are succeeded by hard-wood trees, other birds will take the places of those driven out;* but where, as in the suburbs of cities, these trees are cut and the ground cleared of even shrubbery, the sparrows, warblers, towhees and thrushes are driven out, as well as the wood birds. Lawns, golf links, country club grounds and grassy parks are unsuitable for the birds of the tangle, and they will not live in such places. The work of destroying the gypsy moth is now necessitating much tree cutting and cleaning up of shrubbery and tangles. This is bad for the birds, and must result in reducing the numbers of some species in the region infested by the moth.

Mr. C. J. Maynard, in his recent work, "The warblers of New England,"† speaks particularly of the warblers having been driven from parks, pleasure grounds and the vicinity of cities by the destruction of the shrubbery. While this may not diminish the number of birds in the State, it tends to drive the birds away from many places where they might be retained under a different policy.

The draining of meadows and marshes drives out the birds that frequent these places. Thousands of acres have been drained and made into cranberry bogs; many swamps have been flowed for reservoirs; swamps near cities are drained and filled. The extension of cities, the building of summer cottages along the coasts, and the increase of population generally, all tend to drive out the birds from their chosen haunts. The effect of these repellent agencies is to reduce the area of the region furnishing a food supply to the birds, and so, in the end, to decrease in the aggregate the number of birds.

* Prof. J. W. Votey of Burlington, Vt., believes that the growth which follows the cutting off of the spruce furnishes better nesting areas for the birds than those they formerly had.

† Completed Jan. 1, 1905.

The Natural Enemies of Birds.

In the opinion of many correspondents, the natural enemies of birds do no appreciable injury, while others consider them the chief cause of the decrease of birds. It is noticeable that some sportsmen and gunners complain particularly of hawks, foxes, crows, skunks and weasels. At first sight it might seem that those most responsible for the decrease of birds were trying to shift the blame; but we must remember that those who are most in the woods with the birds are most likely to observe their destruction by their natural enemies.

Under normal conditions, the natural enemies of birds are also their friends. There is no better proof of this than the statements made by the early settlers at a time when game birds were here in great abundance. Eagles and hawks were then far more numerous than they are now. Evidently they produced no appreciable effect on the numbers of game birds.

Hawks which feed on birds will overtake the crippled, sickly, least active or most conspicuous birds. This results in a survival of the wariest, strongest, most active and least conspicuous individuals, — in a word, the fittest. It prevents the spread of disease and the propagation of weakness and unfitness; it preserves the race. This is true to a much less extent of the effect of shooting, for a charge of shot will overtake the strongest as well as the weakest, — the fit as well as the unfit. Hawks, owls, foxes and other so-called enemies of birds also protect birds in another way. The horned owl, no doubt, now and then kills a grouse; but it also kills the skunk and crow, which destroy the grouse eggs or young. Hawks may kill game birds as well as other birds; but they also kill squirrels, crows, jays and weasels, the enemies of these birds. All this may be true of the hunter also; but hawks, owls, foxes and weasels kill, in addition, field-mice, deer-mice and shrews, all of which might otherwise increase unduly, and become very destructive to eggs and young birds. No one knows how often the nests of birds are broken up by deer-mice. They climb trees like squirrels, nest in hollow trees, and may be as great a dan-

ger to birds as is the dormouse of Europe. Shrews are notorious flesh-eaters, and possibly may be very destructive to ground-nesting birds; while field-mice, when pushed for food, are among the most destructive rodents known. These creatures probably feed mainly at night; their habits are not well known. They can be held in check by natural means only, hence we must *beware of destroying the animals that feed on them*. Acknowledging, as we must, that under natural conditions the natural enemies of birds are useful, there is no doubt that under the artificial conditions produced by man some of them may at times need artificial check. Under natural conditions, the crow is certainly a valuable force in nature; but when we have destroyed the raccoons, the larger hawks, owls and eagles,—the only creatures besides man, perhaps, which serve to hold the crow in check,—then we must also check the increase of the crow, or, wanting sufficient food, it will become very destructive to grain, fruit, fowls and smaller birds. In like manner we have destroyed the wolves, which formerly kept the fox in check; we must, then, check the fox, lest it, increasing, attack our fowls and the game and insectivorous birds. For this reason, it is well that the fox and crow are not protected by law.

Partly because of the fact that the natural enemies of birds may sometimes need an artificial check, and partly because the injury done by them is often much magnified, it seems best to publish some evidence of their comparative harmfulness, under the conditions now prevailing in this Commonwealth.

The natural enemies of birds, noted as harmful by the observers who have contributed to this portion of the report, may be arranged in the following order, with reference to the number reporting each: cats, eighty-two reports; foxes, fifty-eight; crows, fifty-four; English sparrows, thirty-nine; hawks, thirty-four; jays, twenty-six; owls, twenty-two; the elements, twenty-one;* weasels, seventeen; skunks, six; snakes, three; pheasants, three; minks, three; orioles, three; chipmunks, two; raccoons, one.

* This subject was quite fully treated in my last special report, and will not be further noticed here.

Cats and Dogs. — The destructiveness of the cat is noted not only by the greatest number of observers, but, with remarkable unanimity, nearly all who report on the natural enemies of birds place the cat first among destructive animals. The domestic cat, then, introduced, fed, pampered and petted by man, leads the list, and sometimes leads even the sportsman in number of birds killed per day. Mr. Brewster tells of a day's hunt by four sportsmen with their dogs, in which they killed but one game bird, a bob-white. On their return at night to the farmhouse where they were staying, they found that the old cat had beaten their score, having brought in, during the day, two bob-whites and one grouse. Reports of the cat's destructiveness come from every county in the State. Cats in good hunting grounds will average at least fifty birds each per year. I have recorded heretofore the destruction of all the young birds in six nests and two of the parent birds by one cat in a day. Cats kill for the sake of killing, and destroy more birds than they can eat. They take a savage pleasure in playing with their prey, and torturing it in the most cruel manner. Cats are also more destructive than other animals, because so much more abundant. A friend who was raising pheasants was obliged to kill over two hundred cats in a few years. Game birds suffer much from the cat, but the smaller birds suffer more. Cats are far more destructive to birds than the fox, for they climb trees and take the young out of the nests. They easily catch young birds which are just learning to fly. They frequently catch the adult birds upon the ground when they are feeding, or when they are drinking or bathing. The most harmful characteristic of the cat is its tendency to revert to a wild state. If a dog loses its master and cannot find its home, it seeks to form the acquaintance of a new master; but the cat is quite as likely to take to the woods and run wild. It then becomes a terror to all living things which it can master. Whoever turns out or abandons a cat or a kitten in the country has much to answer for. Proofs of the destructiveness of cats are not wanting. They were introduced on Sable Island, off the coast of Nova Scotia, about 1880. They ran wild, and, multiplying rapidly, exterminated the rabbits which had been in possession of the island for half a

century.* On Aldabra Island, about two hundred miles north-west of Madagascar, cats are common. They have decimated the birds, having exterminated a flightless rail, an interesting bird peculiar to this group of islands. Cats are also numerous on Glorioso Island, and, as a consequence, the birds on this island are even less common than on Aldabra.†

Dogs destroy comparatively few birds, but some dogs will eat every egg they can find. Some dogs catch and kill young and even adult game birds. Dogs, like cats, kill other animals for sport. They are not nearly so expert at catching birds as cats, but they chase and molest birds even where they cannot catch them.

The Red Fox.—Fifty-eight people regard the fox as one of the most injurious enemies of birds, thus placing it next to the cat in destructiveness. This is entirely at variance with my experience. I have followed the tracks of foxes for many weary miles through the snow about Wareham, where they seem to live, in winter at least, on mice, marine animals, an occasional muskrat, and such bones and dead marine and other animals as they can pick up; but I have never seen any conclusive evidence there that a fox had killed a bird. My son dug out a fox's burrow, but there was no sign that any live bird had been taken there. Foxes pick up all sorts of meat scraps, chicken legs, heads, etc., and kill some birds, as well as poultry; but, according to my experience, this is the exception and not the rule. Mr. William Brewster, who has been in the woods more than most gunners or sportsmen, tells me that he has seen very little positive evidence of the destruction of birds by foxes, although occasionally they kill game birds. Mr. William S. Perry of Worcester says that foxes kill practically no birds. He has shot a great many foxes and examined their stomach contents, as well as those of foxes killed by others, and says he has never found the remains of a bird in a fox's stomach. At a recent meeting of the Massachusetts Fish and Game Protective Association, Mr. A. B.

* "The danger of introducing noxious animals and birds," Dr. T. S. Palmer, Year Book of the United States Department of Agriculture for 1898, pp. 89, 90.

† Proc. U. S. National Museum, XVI., 1894, pp. 762, 764.

F. Kinney stated that he had examined the stomachs of eighty-five foxes, and found only two quail, one woodcock and one partridge. Mice, frogs, rabbits, berries and frozen apples were among the food material found. Mr. H. W. Tinkham of Touisset says that in his hunts this year he has observed only one case where a bird had been killed by a fox; the bird was a crow. Of thirteen fox stomachs he examined, only two showed any remains of birds; and out of ninety fox excrements, only one showed birds' remains. The food evidently consisted mainly of mice and other small mammals.*

This, however, is only negative evidence. There is convincing, positive evidence of the destructiveness of the fox to offer. Mr. C. L. Perkins of Newburyport writes: "Have made it a practice, when skinning foxes, to open the stomach, and have found, in seasons of bare ground, moles, field-mice, etc.; but when the earth is covered with snow, the stomach will generally contain remains of grouse or rabbits. This is no doubt due to the habit of the grouse to bury in the snow." Mr. F. B. McKechnie of Ponkapog tells the following: "In May and June of the present year I was at a loss to account for the destruction of numbers of birds' nests found by a friend and myself about Ponkapog. Catbirds, song sparrows, thrashers, black-billed cuckoos, ovenbirds, redstarts and other nests were robbed of their contents with astonishing rapidity. Red squirrels and snakes were very scarce in the pasture where these nests were found, and after some discussion we laid the destruction to foxes. It is well known that foxes will follow a man's track; but it was not for some time that we found out that they were deliberately following us, and taking the eggs and young of all the nests, either on or near the ground, which we had stopped to examine. In the first part of June we got the first clew, when a young fox, following Mr. Horton, walked to within a few yards of him in a swamp where he had stopped to watch a Canada warbler. In the morn-

* The inadequacy of an examination of stomach contents alone to determine the character of an animal's food is seen, when we consider that we get, in this way, evidence of only one meal out of all that the animal has eaten during its lifetime.

ing of June 19 Mr. Horton again saw two foxes, nearly full-grown, skulking along behind him. He directed me to a song sparrow's nest with six eggs which he had found and photographed during the morning, but before I got there the eggs were taken. In fact, as many as twelve nests were robbed before we discovered the cause."

Mr. I. Chester Horton corroborates this. He writes: "I have spent some time the last two years in photographing birds' nests on, or near, the ground, and was sorry to find in 1904 that nearly all the nests I visited were robbed and destroyed. One song sparrow's nest was robbed a few hours after I visited it, apparently by some animal that had followed my track. One morning, while watching a bird, I concealed myself in the branches of a small pine tree. While watching there I heard a fox bark, and soon found he was coming in my direction. In a few minutes two foxes appeared, following my track, and came within fifty feet of where I stood, stopped as though they partly detected my presence, and, after playing a few minutes, made off into the woods. On another occasion a half-grown fox, following my track, came within fifteen feet of where I stood, perfectly motionless, in a swamp. I have no doubt that foxes discovered that I was seeking birds' nests, and followed me and robbed the nests I found. While photographing nests I found three ovenbirds' nests, within a radius of a few hundred feet, one being partly built, the other two with freshly laid eggs. I waited several days and visited them again. I should have stated that one of these nests was about five feet from a path, and, knowing that something was following me and destroying nests, I did not move out of the path in visiting this nest. The nest that I found partly built I photographed after it had eggs, as it was rather peculiar, being constructed entirely of, and lined with, pine needles. I also intended to photograph the third nest, with the bird on it, as she was very tame; but on my third visit it had been robbed, as was the one I photographed. I visited the one by the path several times, but *never stepped out of the path*, and did not photograph it, and was gratified to see the eggs hatch out and the young



NEST OF SONG SPARROW.

Photographed by I. Chester Horton, and afterwards robbed of the Eggs by a Fox.

grow to be large enough to leave the nest. One nest I found, that of a brown thrush, two feet high in a blueberry bush, was robbed when it had young half grown."

If foxes follow the tracks of people who find birds' nests, then bird study and photography may prove dangerous to the birds.

Mr. C. E. Ingalls once intimated to me that he had some reason to believe that a fox had followed his tracks to a bird's nest. In response to a written inquiry he sends the following: "I had at one time under observation the nest of a meadowlark. One afternoon about sundown I passed the nest with its full complement of young a day or two old, with everything looking favorable for a successful development. I passed from the meadow where the nest was situated up to a hillside adjoining, and in full view of the location of the nest. I seated myself upon the ground to watch some spotted sandpipers that I felt sure were nesting beside the brook flowing through the meadow, when I saw a fox come to the lower end of the meadow and begin to hunt, as I supposed, for mice. In the course of his quartering over the ground he apparently stumbled onto my lark's nest, and, as he became aware of its proximity, he pounced sharply to one side right into it. I jumped to my feet and shouted to him, and ran towards the nest, while Mr. Fox loped airily and quickly to the woods. When I arrived on the scene, two of the young were gone and one other lay about a foot from the nest, dead. One pleasant evening in May I was sitting on a log near the edge of a piece of mowing land, where it joined some scrub on the edge of a wood. . . . While waiting, I saw a fox on the edge of the grass land mincing along, in no hurry, and evidently hunting for mice or grasshoppers, as he would thrust his muzzle into the grass, then dance around as if watching some moving object in the grass, make a grab, then move along, all the time coming nearer to my position, which was hidden from him so long as I remained motionless. Suddenly, when the fox was within five or six rods of me, a big ball of feathers flew out of the scrub at him and drove him some distance into the grass land. I immediately sized

the situation up. A partridge (ruffed grouse) was warning Mr. Fox that she had claims to that particular tract of land that he would be required to respect. But Mr. Fox was evidently hungry, so he followed the brave little mother back to her nest beside a stump on the edge of the scrub. Although the bird made one or more rushes, they were of no avail, and, although I did not at first intend to harm the fox, as at that time of year he would be of no use to me dead, I regarded it, in the light of recent developments, to be a case for armed intervention, so I put a bullet where it would do the most good, and he died within his length of the nest, with his mouth and throat filled with egg contents."

Probably foxes kill some of the young of the smaller birds when they are learning to fly, catching them as cats do. Of this habit Mr. F. H. Mosher says: "I have seen but one instance of the fox catching a bird, and that was several years ago. I was standing on a rise of ground that overlooked a wet meadow. A fox came out of the woods and appeared to be hunting for mice in the grass. As he came opposite a small clump of bushes, a small bird flew out and started for the woods. The fox ran a few steps after it and gave a tremendous spring, and caught it on the wing. Probably it was a young bird."

If foxes quarter over the ground in summer, as they certainly do in winter, it would seem impossible for any nest on the ground to escape their notice, unless, indeed, they are unable to smell the sitting bird. Prof. C. F. Hodge told me in 1903 that he had found by experiment that trained pointer and setter dogs were unable to find a ruffed grouse sitting on her nest, even when, in one case, the bird had left her nest and walked about a short time previously. This seems to indicate that these birds leave no scent during incubation; but Mr. Brewster informs me that his dog on more than one occasion found a woodcock on her nest. It seems probable, however, that ordinarily dogs and foxes find only such nests as they happen to stumble upon; otherwise, what is to prevent them from destroying the broods of nearly all ground-breeding birds?

In order to determine the value of the evidence against the natural enemies of birds, letters were written to nearly all who regarded crows, jays, foxes, squirrels and weasels as particularly injurious, inquiring what evidence had led to this conclusion. Some of the replies showed that the evidence was merely hearsay, others appeared to be the result of personal observation.

Regarding foxes, Mr. J. H. Wood of Pittsfield writes as follows: "I visited a swamp in the vicinity of Ashley Lake, for the purpose of running the white rabbits with a hound. There had been a heavy snowfall a day or two before, and in following a bank on the edge of the swamp we noticed several holes in the snow at the foot of the bank under some spruce trees. We also noticed a fox track and some feathers about a hole. This led me to investigate, and I found that this one fox had killed four out of the seven partridge that had taken refuge in the snow from the storm of the previous day. We tracked this fox from where he had eaten the first bird to a ledge, where we succeeded in finding one of the birds that had been carried there by the fox. My next experience was in 1902, about the 20th of November, when I found a place where some men were getting out stone. They had uncovered a fox's burrow where there had been a litter of foxes the past summer, and if you could have seen the parts and feathers of the partridge you would have been surprised."

Mr. W. J. Cross of Becket, also in Berkshire County, a fox hunter himself, says: "Every hunter of the fox has found, when following a track, the circle of feathers telling the story of where the ruffed grouse made his last dive under the snow to furnish a meal for Mr. Fox the next morning."

Mr. W. H. Snow of Becket says: "I have seen where the foxes have killed and eaten the partridges when there is a snowstorm. The partridges get under spruce trees to get shelter for the night, and they are caught by the foxes."

Mr. Thomas Allen of Bernardston, Franklin County, asserts that he has found the remains of grouse partly eaten, or feathers alone remaining, where fox tracks showed

plainly. Others have related to him similar experiences. One saw a fox eating a grouse.

Mr. George E. Whitehead of Millbury, Worcester County, says: "Every observing hunter or trapper can tell you the story of the fox's attempt to ambush a partridge, as told by the tracks on the snow. One can plainly see how the fox took advantage of every bit of natural cover, while he sneaked to where he made his spring. The fact that a few feathers are left shows that he met with success."

Mr. Otis Thayer of West Quincy, Norfolk County, says that after the Blue Hills Reservation was closed to hunters, game increased very rapidly, for foxes were scarce; but as the foxes increased, game decreased. Formerly, he says, this region was good hunting ground; now he finds no game, but always finds foxes. They are now so plentiful that they are becoming destructive to poultry as the game decreases.

Mr. W. H. Aspinwall, secretary of the Massachusetts Rod and Gun Club, writes as follows: "During the last few years I have twice, if I remember aright, found the place where a fox had very recently killed a partridge and eaten him. It was so recent an act that my setter pointed at the place, and I went up and found the remains of the partridge, and foxes' tracks all around. The only fox that I ever shot I ran on quite unexpectedly while working up a bevy of quail. It was a young dog fox, and he was on the same errand that I was, for the quail flushed when I killed the fox. I have made a great many inquiries among the native hunters in our country districts, and they all believe that foxes and skunks, especially in the breeding season, are very destructive to our game birds. I have been told by a number that in digging out foxes that have holed they have found the remains of partridges, and even of the smaller birds, such as robins, etc. Only last week a friend of mine who is an extremely good observer and sportsman told me that he found the remains of a robin which a fox had just killed. I believe that the chief difficulty is in the breeding season, when it is quite easy for foxes to catch the hen bird on a nest. I think that most people agree that, as

the foxes have increased tremendously in numbers in the neighborhood of our reservations, such as the Blue Hills Reservation, the partridges have decreased in about the same proportion. That foxes have increased in eastern Massachusetts is proved by the evidence that within the last few years a great deal of poultry has been destroyed, even in such a closely populated district as Chestnut Hill; and foxes have been seen quite frequently. I believe that the State should in some way make a decided stand in destroying the vermin in the reservations, if they desire to make this a favorite breeding ground for the birds." Considerable further evidence of this same character was received. There is at least one reservation where foxes are not protected. Mr. Charles P. Price, superintendent of the Middlesex Fells Reservation, tells me that the foxes have been all killed or driven out of the reservation, and that game birds have increased there. About fifteen foxes per year were killed for three years.

Mr. Henry B. Bigelow of Cohasset says: "Foxes are particularly destructive to quail and partridges in this neighborhood; the entrance to every fox hole is strewn with their feathers; and to my certain knowledge one fox, in 1899, killed, during the autumn, six out of a covey of twelve to fourteen quail. Partridges also suffer, as shown by the presence of their feathers about the dens, as do also domestic fowls."

Mr. S. J. Harris of East Dedham writes: "I once shot at a fox having a partridge in his mouth. I did not know that it was a partridge when I fired at the fox, but he dropped it when I fired, and of course I got the partridge."

The limits of this report will not permit the printing of half the evidence received against the fox. Some evidence from other parts of the State is given in brief below. "A common occurrence to find where foxes have caught and eaten partridges, both on snow and bare ground." (Herbert A. Bent, Franklin, Norfolk County.) "Have never yet seen a section of country where foxes and partridges were plentiful at the same time." (H. R. Packard, Attle-

borough, Bristol County.) "Have seen feathers of birds around his burrow. Where the fox lives, the game disappears." (A. C. Southworth, Lakeville, Plymouth County.)

This evidence, like the rest, is largely circumstantial; but it seems sufficient to prejudice the case of the fox, somewhat, and leads to the belief that in some localities we may have too many foxes. The fox is well able to take care of itself. Its natural enemies have been nearly all extirpated, and it must be kept within bounds, or it may become a pest. Under ordinary conditions, however, there are fox hunters enough to hold the fox in check.

The Common Crow. — The crow is now regarded by so many people as a useful and much-maligned bird, that it may not be out of place to present here some of the evidence against it. I have already given to this Board some of my experience with the crow, concerning its destructiveness to birds,* and will only say here that I have repeatedly observed crows in the act of destroying the eggs and young of other birds; they are so addicted to nest-robbing that it is a wonder that any young of the smaller birds can be reared where crows are numerous, and my experience indicates that in some cases very few are actually reared in such localities. Since, in view of my own experience, I may be considered as prejudiced against the bird, I will quote mainly from new evidence secured in this inquiry. It will be impossible to present here more than a small part of the evidence received, giving it in the words of the witnesses, to avoid any possible distortion.

In a letter written by Mr. Ingalls, in 1896, he says: "I have seen the nests of many birds of several species, from the ruffed grouse to the red-eye and chippy, robbed before my own eyes, and have evidence of many more. Every season, late in May or early in June, the crows make a raid on the birds nesting in the shade trees along our village streets and in orchards and private grounds, systematically searching every tree, destroying nests, and eating or carrying away the eggs and young." Now, after eight years

* Report Massachusetts State Board of Agriculture, 1896, "The crow in Massachusetts," p. 285; see also *ibid.*, 1902, p. 147.

more experience, he rates the crow as the most destructive of all the natural enemies of birds.

Here is another experience from another county : " For the past ten years, during the breeding season of the birds, from the last of May through June and July of each year, I have watched the crows eat the eggs and little birds. I have watched them start at 4 o'clock in the morning, or a little later, and hunt over the shade trees that line the streets for the eggs and young birds, even going into the trees that stand close to the buildings, where people would not think a crow would ever go. This is done, of course, before people rise ; and as soon as any one stirs out they will leave, but will begin the next morning just the same. Any one can plainly see what they are up to. After the breeding season they will not visit the shade trees until the breeding season begins the next year, and then they are ready to follow them up again." (Anson O. Howard, East Northfield, Franklin County.)

" I have many times seen crows eating robins' eggs, and have also seen them flying from nests with the young birds in their beaks. This was probably food for their own young. I often see them very early in the morning, searching trees near houses where small birds have nests." (Samuel S. Symmes, Winchester, Middlesex County.)

" I have seen crows come to the eaves of a house and take young robins from the nest." (S. F. Stockwell, Auburn, Worcester County.)

" Crows are remarkably plentiful here. Have not known a nest of young birds to mature this year. Saw a crow take young out of nests right by the house." (W. J. Hunter, Lincoln, Middlesex County.)

" I have seen crows drive birds from the nest, and take and eat whatever was in it, whether young birds or eggs. There is one tall elm tree in particular on the boundaries of our place where I have watched them repeatedly attack the birds and eat the young." (Amelia M. Brastow, Wrentham, Norfolk County.)

" The crows visit the orchard very early in the morning, usually about sunrise, and after their visit you can find

many nests without eggs, that had a full complement the day before." (I. Chester Horton, Ponkapog, Canton, Norfolk County.)

"Directly back of my house is a bush pasture, in which are a few pines, cedars and birches. In the pines and cedars numerous robins build every spring; and every spring about the nesting time of the crows I see them searching through these pines and cedars for — something. At no other time of year do I ever see a crow even alight in this pasture, to say nothing about visiting each tree separately, with every action indicating a search for something. One morning a few years ago I saw a crow drop into the top of a certain cedar in this pasture, and pick the eggs, one by one, from a robin's nest there and eat them. A year or so later I saw the same thing done again, although this nest was in another cedar. At another time I saw a crow visit a robin's nest in an oak tree. This nest contained young birds perhaps a week old, and despite the protests of the parent birds, they were all carried away, apparently to feed the crow's young. In a clump of pines south-west of the house a pair of crows had a nest one year, while the crows' hunting ground was to the east of the house, so that the old crows often flew over the house while passing from the hunting ground to the nest. On one of these trips a crow had in its bill a young bird, unfeathered, which I identified at the time as a young robin. While there are many nests built every year in the pasture referred to, I estimate that not one in ten ever contains young, and not half the young ever leave the nest alive. I know that at least one crow visited this pasture every day." (R. H. Carr, Broekton, Plymouth County.)

"Crows destroy many nests of eggs. Think them the worst enemy." (R. H. Cushman, Bernardston, Franklin County.)

"I have seen crows attack the nests of our common birds many times, and carry off the young birds to be used for feeding their own young during the nesting season. . . . Both crows and red squirrels are fond of birds' eggs, and I have found the empty shells of eggs of birds near their nests

many times." (Henry N. Smith, South Sudbury, Middlesex County.)

"I have many times seen crows in the act of robbing birds' nests." (Fred H. Kennard, Brookline, Norfolk County.)

"I, and an absolutely trustworthy friend, have on several occasions seen crows carrying young birds away, though we have been unable to identify the victims. Last June a robin's nest near my house was despoiled by crows, and three young birds were taken; the fourth fell to the ground." (Emily B. Adams, Springfield, Hampden County.)

"This bird does more damage to the farmer than almost all other birds. He deliberately kills our young song birds, our insect-eating birds. He has been seen to go through our grove of maple trees, each side of the highway, destroying the nests and young birds. Our village is well provided with shade trees, and nearly every tree is occupied by one or more birds' nests, mostly robins, with many smaller birds; and in the woods outside we always have plenty of crows. In the nesting season, early in the morning, from half-past 3 to 5, you will find plenty of crows hunting the trees for nests, and it is always a *still hunt*. I make it a point to look after them at this season, and have shot quite a number of them with both eggs and young birds in their possession. One morning I shot one from my door with a young robin, two-thirds grown, in his bill. There are two or three others here that I have interested in protecting the birds, so that we manage to have some of them, and make it rather hot for the crows." (W. J. Cross, Becket, Berkshire County.)

"The crows gather in quantities about the maple trees lining the highway, and fight our robins, often destroying the old bird, and then destroying the eggs or young; also the chipping sparrow. Then, again, they attack our red-winged blackbirds' nests. The crow is well aware who has the gun, and makes his visits early, about 3.30 A.M., as soon as signs of life appear. He is out when no gun is at hand. This is our greatest enemy to song birds, and a bounty ought to be placed on him." (Edgar C. Clark, Wilbraham, Hampden County.)

The above statements, coming, as they do, from many sections of the State, go far to substantiate the claim made by some persons that the crow is everywhere the greatest natural enemy of the smaller birds. Professor Hodge told me that crows had repeatedly robbed robins' nests *in a city lot*, under his windows, coming very early in the morning, before people generally were out of bed. They are just as inveterate thieves of the eggs and young of the larger birds. Several observers speak of crows taking the eggs and young of fowls and turkeys. This is a habit so well known that it hardly need be alluded to here, except to show their taste for eggs and nestlings.

Mr. Price, at the Middlesex Fells Reservation, is raising both wild and domesticated ducks and pheasants. He says that crows took five out of seven young ducks in one day. In June about one hundred Mallard ducks were turned out on a small pond. Ducks lay their eggs very early in the morning, and every morning crows were seen carrying off eggs. Mr. Price says they took about fifty each week, carrying off, altogether, from eight hundred to one thousand eggs during the season, taking about all the eggs laid by the ducks.

It is probable that where one instance of crows robbing nests is observed, a thousand pass unnoticed. There is only one redeeming feature in the case of the crow, and that is, that not all crows habitually rob birds' nests; for if they did, they would destroy most other birds, and in time we should have few birds but crows.

Squirrels. — Forty-two observers regard squirrels as very injurious to birds, thus ranking them next to the crow in destructiveness, and some regard them as more vicious than the crow. Others believe that squirrels do no harm, as they have never seen them troubling birds in any way, nor seen birds manifesting any alarm at their presence. Mr. Brewster is very positive that the squirrels have never troubled the birds at his place in Cambridge, where he has watched carefully for years the habits of both birds and squirrels. Mason A. Walton, the hermit of Gloucester, says that he has several times seen red squirrels examining

the nests of birds, but that they never disturbed the nests or young birds.*

There may be many good squirrels, but there certainly are some bad ones, as the literature of field natural history teems with instances of their destructiveness. To convince the reader, some new evidence is appended, collected during this inquiry.

“Red squirrels, I think, do fully as much damage as crows. For a number of years I had quite a colony of red squirrels on my premises, and protected them, as the family liked to see them around. But one morning there was a great commotion among the robins in the yard; I stepped to the door with gun in hand, expecting to find crows, but, on looking closely, found a red squirrel at the nest, from which he soon started, carrying something in his mouth. I fired at him, and he dropped to the ground, and with him a young robin with the head partly eaten; and on looking the ground over, I found two others in the same condition. Since then by observing closely I have found them despoiling the nests of robins and other birds of either the eggs or young, and shoot them on sight, as a nuisance.” (W. J. Cross.)

“I was at work in one of my gardens when my attention was attracted by the cries of a pair of thrushes near by. On approaching, I discovered a red squirrel sitting upon the nest, busily devouring their young. I drove the little rascal away with stones, but he returned again, and had bitten the remaining birds before I reached the nest again, it being several rods distant. The next day I found nothing left but the empty nest. The young thrushes were more than half grown, and were all destroyed, undoubtedly by this same squirrel.” (Henry N. Smith.)

“There is an apple orchard on the rear of my place, and during the summer of 1903 I was surprised to see the robins, etc., continually building new nests. They would no sooner have a nest finished and eggs laid, than they would be at work on a new one, usually in the same tree, the first one

* “A hermit's wild friends,” Mason A. Walton, p. 69.

having been abandoned and the eggs missing. One day in passing through the orchard I saw some robins fluttering and scolding about one of the nests, and, being interested, tried to see the cause of the trouble. I found there was a red squirrel sitting on the edge of the nest, devouring the eggs as calmly as possible. I had noticed previously that a pair of red squirrels made their home in a hole in one of the trees, and saw that they were undoubtedly the cause of the depleted nests. I killed the squirrels, and there was no more trouble." (I. C. Horton.)

"Some five years ago I noticed that some species of birds were decreasing in a certain small piece of woodland that I look over pretty carefully, and the many rifled nests convinced me the red squirrels were doing the mischief. I started a campaign after them, and from that time until the present have shot them on sight. During this time have caught them in the act of rifling robins' and catbirds' nests, and with fledglings in their mouths; also found egg shells around squirrels' nests on the ground. On one occasion saw a pair of robins catch a red squirrel at their nest, and with the help of others drive him from it and chase him to cover. An egg had been taken from this nest, which I found on the ground uninjured, where he evidently dropped it in flight. For some time I had another robin's egg, dropped by a red squirrel, that had been neatly punctured ready to suck." (F. C. Dodge.)

"In the spring of 1896 my attention was first drawn to the red squirrels robbing birds' nests. In the early morning I have repeatedly seen the red squirrels going from tree to tree, hunting for birds' nests. If these nests contained young birds, they were taken out and eaten by the squirrels. The birds around our place decreased rapidly, and the squirrels increased. Catbirds, which had begun to nest around here in numbers, as the locality apparently suited them, were entirely driven off, and no longer build nests here. I think it was about four years ago that we killed off numbers of red squirrels, and the birds began then to increase." (Amelia M. Brastow.)

"I have many times seen red squirrels in the act of rob-

bing birds' nests, and this year saw a young gray apparently at the same trick." (F. H. Kennard.)

The foregoing instances seem to establish the fact that certain squirrels at least which have acquired the habit of molesting birds are among their most dangerous enemies. Squirrels are very active, keen of sight, can climb anywhere in a tree, and it is difficult for a bird smaller than a hawk or crow to defend its nest against them. I have seen a squirrel continually attempt to reach the nest of a robin, although, being assailed from all sides by both robins and jays, it was struck and repeatedly driven back toward the ground. In courage and activity the red squirrel is superior to the gray, and is usually regarded as the greater enemy to birds. At Wareham the birds seem to regard both species with equal aversion.

Some squirrels have a habit of cracking the skulls of young birds, as they would a nut. Mr. F. H. Mosher tells me he has observed this habit at Hyde Park, Dutchess County, N. Y., and also at Dartmouth, Mass. At Hyde Park both red and gray squirrels were observed in the act. He saw the squirrels attack the young on the nests on six different occasions. The birds molested were the chipping sparrow, robin and red-eyed vireo. The squirrel cut off the head of each young bird, dropping the body to the ground, and ate out the brains from the skull. One day in the spring of 1903 he heard the cries of robins at his own place in Dartmouth. He saw a gray squirrel climbing to a robin's nest, and before he could reach the spot the squirrel had the head of a young robin in its mouth. The bird was dead when he reached it. Gray squirrels have been the culprits in each case but one that he has observed.

Mr. Brewster told me that he saw a wounded thrush pursued and overtaken by a chipmunk, that killed the bird and was eating its brains when he reached the spot. He took the bird from the squirrel, but the little animal was so eager and fearless that it would not leave, but stood up trying to reach the bird, like a dog begging for a bone.

Mr. H. H. Dewey writes from New Lenox, Berkshire County, as follows: "Last summer I had occasion to ob-

serve a nest of small yellowbirds in a willow bush near where I milked my cows. One morning, as I was milking, I heard several of the old birds making a great noise of distress, and on going near the nest I discovered a chipmunk just swallowing one of the young ones which had been hatched about three days. The chipmunk escaped, and on going to the nest I found only one of the four left. I heard the cries of the old ones early the next morning, and on hurrying to the nest I saw the last young bird being swallowed whole by the chipmunk, which again made its escape. I have for a number of years been suspicious of the little animals doing great damage to either the young birds or the eggs, but have never been able to catch one in the act before."

It seems improbable that the chipmunk actually swallowed a young bird whole, but it may have stowed it away in its large cheek-pouches, for convenience in carrying it off. It is probable that only certain individuals among squirrels molest birds. Such individuals must be killed by those who would protect the birds.

The English Sparrow. — Many people consider this the most destructive of all the natural enemies of birds, and it may be so, in and near the cities, with the possible exception of the cat. The story of how this bird was introduced here, invading the cities and villages, destroying the native birds or driving them out into the country, was told long ago.* Much might be added to it from my own experience and that of correspondents, but lack of space forbids. There are some localities in the country to which the sparrow has not penetrated, and it has seemed to me that it was hardly holding its own for the past few years, especially in eastern Massachusetts, where in some sections sparrows are not so numerous as in the past, and the native birds are beginning to reoccupy their old haunts. The information gained in this inquiry, however, does not confirm this belief, for every county, except Suffolk, Dukes, Barnstable and

* "The English sparrow in North America," Walter B. Barrows, Bulletin I., Division of Economic Ornithology and Mammalogy, United States Department of Agriculture.

Nantucket, sends reports of an increase of these birds. The only reports of an increase in the cities come from Fitchburg, Lowell and Waltham; all the rest come from towns, and many from the smaller and more remote villages. All this seems to indicate that, outside the larger cities, the sparrows are still increasing in numbers and extending their baleful influence.

Evidence recently submitted to, and published by, Mr. C. A. Reed, editor of "American ornithology,"* from correspondents in different parts of the country, indicates that the sparrow is still destructive to other birds. The sparrow is largely responsible for the decrease in swallows, martins and wrens. For more than thirty years it has driven these and other birds from their former breeding places, torn down their nests and killed them and their young. The tree swallows and martins have been driven from the bird-houses. The nests of the cliff swallows have been torn down or occupied by the sparrows. The barn swallows have been driven from the buildings they formerly occupied, and because of this persecution the wrens have actually disappeared from the neighborhood of towns and villages. If the sparrow is still increasing and spreading out into the country, we may look for a continued decrease of swallows and wrens.

Hawks.—Every one will admit that hawks kill birds. Thirty-four observers consider them seriously destructive. It is to be noted, however, that, as in the case of the fox, the chief evidence is given by gunners. Nevertheless, it is probably true that, after man, the great bird destroyer, birds are among the greatest enemies of birds. No other animals can pursue birds through the air. No others can follow them in their vast migrations, discover them so far off, or overtake and strike them so quickly. We must, then, look among rapacious birds themselves for some of the most potent checks to bird increase.

The bald eagle feeds mainly on fish, and has little effect on the numbers of other birds. The red-tailed hawk is not now generally common. The red-shouldered hawk seldom kills

* Vol. 4, No. 5, May, 1904.

birds or poultry, but, living largely on field-mice, is believed to be a friend to the farmer; but the goshawk, duck hawk, Cooper hawk and sharp-shinned hawk are all bird slayers. Of these four, the Cooper and sharp-shinned hawks, being most common, are most destructive. The duck hawk kills, like the cat, for the sake of killing. It pursues its prey on the wing, rapidly overtaking swift-flying ducks. Mr. C. E. Bailey reports seeing a duck hawk overtake and strike three teal in succession, and then fly off, leaving its victims lying on the water. Fortunately, this hawk is rather rare in Massachusetts. The goshawk is here occasionally in winter, but the Cooper hawk breeds here, and is still common, locally if not generally. This bird, which is sometimes known as the partridge hawk or chicken hawk, is a feathered pirate. Swift, keen and daring, it is the terror of both birds and poultry. It is the one bird of all others to neutralize the local efforts of the bird protectionist. It is particularly obnoxious to the farmer, for, having once tasted chicken, it continues its forays until it is shot or the chickens shut up. It will sometimes kill full-grown fowls, but probably cannot carry them away. Its keen eye detects the mother bird sitting on the nest. At one swoop it snatches bird, nest, eggs and all in its powerful talons; or it spies the nestlings, and picks them up as food for its own young. Conspicuous songsters, like the brown thrasher, robin, wood thrush, rose-breasted grosbeak and scarlet tanager, are swept from their perches while in full song by this bold marauder, and borne to its ravening brood. Even the crafty blue jay does not always escape. As one of these hawks sweeps into a clearing and strikes its prey, every bird song becomes hushed. In a moment sparrows, warblers, thrushes, titmice, — all the loquacious, musical throng, — find cover, or crouch motionless in their hiding places in silent terror. Grim death has been among them, and it is long before they dare resume their activities. The sharp-shinned hawk is a miniature of the Cooper hawk, although perhaps a trifle slimmer in build. It is widely known as the chicken hawk, and is strong and swift. It is nearly as dangerous to birds as its larger and stronger congener. It breeds here, feeds

its young on birds, and will kill birds as large as a jay. It is often mobbed by jays, but not infrequently strikes one of its tormentors, when all the rest fly off, leaving the hawk to finish its victim.

Probably most of the birds now killed by hawks in Massachusetts are struck down by these two species. Sometimes in the fall these birds may be seen in great numbers migrating south. Mr. W. S. Perry estimates that he saw at least one thousand, mostly sharp-shinned and Cooper hawks, going south Oct. 10, 1892. He watched them flying all day. He estimates that each bird will eat on the average two small birds each day, or seven hundred each year. At that estimate, the one thousand hawks which came within the range of his vision would eat seven hundred thousand birds a year. I regard these two birds and the goshawk as the only hawks that should be shot by gunners, most others being a positive benefit, or so rare as to do little harm.

The pigeon hawk, also a bird hawk, is not common, and the sparrow hawk feeds chiefly on insects. The broad-winged hawk seldom kills birds, and the marsh hawk feeds mainly on small mammals in most localities.

The Blue Jay.—The blue jay, a smaller cousin of the crow, has a similarly unsavory record, and also merits it. It attacks the eggs of birds from the size of the smallest sparrow and warbler to that of the robin. The robins, if at hand, will successfully defend their nests; but the jay will watch, and sometimes eventually appropriates the eggs in the robin's absence. The jay pays little attention to the screaming and protesting vireos, but robs their nests as unconcernedly as though the parent birds were not present. When jays have young in the nest, they sometimes watch the nests of the smaller birds very closely. Hardly is a clutch laid when it disappears, and most of the smaller birds lose at least one set of eggs. I am aware that many people find it hard to believe that such a pretty bird as the blue jay can be such a rascal; therefore, I will not ask belief for my own assertions without producing evidence to support them, for the mere fact that twenty-six observers believe the jay to be a destructive enemy of the smaller birds may not be

considered sufficient evidence on which to condemn the bird.

“Last spring I was disturbed several mornings by an outcry among the birds in the trees near the house. A pair of blue jays were on a marauding tour, and eggs were the morning’s bill of fare.” (Thomas Allen, Bernardston, Franklin County.)

“The crows and jays are destructive to the sparrows, robins and vireos that build in our orchard beside the house, where I have a good chance to see them. I believe the jays are about as bad as the crows. Several robins’ nests are broken up in this way every year, and always one, and generally two or three, of each of the others.” (J. K. Burgess, Dedham, Norfolk County.)

“I have a neighbor . . . who has shot one or two jays in the very act of robbing eggs from nests.” (Daniel Ballard, Millington, Franklin County.)

“I have seen blue jays repeatedly sitting on the edge of a nest, eating the eggs. This season I found a nest of a *Vireo solitarius*. . . . I discovered a blue jay in the act of eating up the eggs. When I went to the nest there was only one left, and the shells of three others. I have had the same experience this year with the nest of *Dendroica virens*. I think jays torment these birds worse than any others. I am convinced that jays, during nesting time, hunt for eggs with great skill and regularity.” (John E. Thayer, Lancaster, Worcester County.)

Colonel Thayer also writes of Mr. William Brewster’s experience. This Mr. Brewster has told me of personally. The methodical manner in which the jays investigated the nests of other birds day after day, and destroyed the eggs, has convinced him of their destructiveness. He says: “I do not consider that owls, hawks (except the Cooper and sharp-shinned), squirrels, weasels or even foxes do any serious harm. The blue jay does very much harm to the smaller birds by eating their eggs; and the crow is also harmful in the same way, but to a less degree, according to my experience.”

Mr. S. J. Harris of East Dedham, Norfolk County, speaks

of his experience with jays as follows: "Of course the old robins would fight the jays away for a while, but they would come right back again. I have known of a bluebird's nest with four or five eggs in it being robbed by jays, for I came along in time to hear the scrimmage, and, on seeing the blue jay in the bluebird's nest, with the bluebirds screaming and flying at the jay, I went and found all the eggs broken, and the jay had eaten the insides."

Owls.—Owls certainly kill some birds, but the number they take is ordinarily so small in proportion to the noxious mammals and insects they destroy that they are believed to be among the most useful of birds. It is, however, rather amusing to hear one friend of the screech owl defending it from the charge of killing small birds, and asserting that it lives on mice and insects, while another says that it is most useful because it destroys so many English sparrows. I have known a screech owl to kill a flicker, occupy its nest and make a meal of the owner. Owls kill many mice, shrews, squirrels, rabbits and other small mammals, and a few birds. The larger species probably kill some game birds. The owls are not so destructive to birds as either hawks or crows. Were they exterminated, we should miss them sadly. The quavering wail of the screech owl at evening is one of the characteristic sounds of our orchards and woodlands; it is becoming altogether too rare in some localities. The booming hoot of the horned owl, now seldom heard, gives warning of the approach of the most dangerous owl of our woods. It kills many hares, or so-called rabbits, mice and rats, and is in this respect a friend to the farmer.

Weasels.—Only seventeen people complain of the weasel, and much of the evidence against it is that of killing chickens. I have for years heard the statement made that weasels were very destructive to game birds. I have followed them for miles, and watched them whenever I could. I have written many letters to people who regard them as destructive, but the nearest thing to evidence against them that has come to me yet is contained in the following notes.

Mr. Thomas Allen of Bernardston says: "Weasels are too sly and quick in movement to be caught. The bird with

small, clean-cut teeth marks in the neck or under the wing is proof of this enemy."

Mr. H. B. Bigelow of Cohasset writes: "Weasels kill some small birds, principally sparrows, along stone walls and hedge rows, where I have found several carcasses, principally, however, English sparrows. In Milton I saw a weasel stalk an English sparrow along a stone wall. They are said to destroy some quail."

Weasels are remarkably savage and bloodthirsty animals, but seem to feed mostly on mice, shrews and moles, for which they hunt daily. When hunting they quarter over the ground much more closely than does the fox, therefore they are more likely to stumble on the nests of birds. An animal which can kill six fowls in a night, as I have known a weasel to do, would easily kill a sitting grouse or any smaller bird which it could surprise on its nest at night.

The weasel is very brave and active. Weasels occasionally attack even human beings. There is an old story of an English girl who was found dead on a moor, her body partly eaten by a party of weasels. I was once, when a boy, attacked by ten of these creatures. They made the occasion quite interesting for me for some minutes, and by reason of their great activity all but one escaped unharmed.

Mr. John Burroughs has observed that weasels can climb trees.* This makes them much more formidable enemies to birds than they otherwise would be, but, as their vision is not particularly acute, and as they rely largely on scent, they are likely to be often at fault. Fortunately, they are not common, but I have never seen any explanation for their comparative scarcity. They have many young and few enemies, although the larger hawks and owls get some of them. They can escape the fox by climbing or hiding. Weasels are not often shot, and traps are seldom set for them, but they are often caught in traps set for other animals.

It is quite possible that these bloodthirsty, ravenous creatures are cannibals. Other carnivorous animals, such as predaceous beetles, owls and wolves, are cannibalistic. Mr.

* "Squirrels and other fur bearers," John Burroughs, p. 87.

Burroughs records that when a pair of weasels was kept in captivity, one killed and ate the other, picking the bones clean.* Their cannibalistic tendencies and the work of the trapper may account for their comparative scarcity.

The Mink. — Minks feed along water courses, where they kill a water-fowl now and then. They also make excursions overland, killing mice, as does the weasel. At times they kill many domestic fowls and some birds. Mr. Brewster has recorded, in "Bird-lore," the almost complete destruction of a colony of bank swallows by one or more minks. Mr. H. B. Bigelow says: "Minks kill few if any quail or partridges, but a good many ducks on the marshes. I have found black ducks, evidently killed and partly eaten by them." Their fur is valuable now; they are trapped much, so they are rather rare, which is fortunate for birds and poultry.

The Skunk. — The skunk is a sluggish and rather stupid animal, but knows enough to steal young chickens from under the mother at night. When a boy I once surprised a skunk apparently eating some grouse eggs, while the bird hovered round, afraid to come to close quarters. Wishing to interrupt the proceedings, I undertook to investigate, but was so warmly received by the undaunted animal that it was soon left in undisputed possession of its ill-gotten meal. Probably the injury done by skunks to birds has been exaggerated. While occasionally they may stumble on a nest of eggs or young birds, they are too slow to pursue and overtake any bird that is able to use its wings or legs. I have seen forty fowls roosting two and one-half feet from the ground in safety, while, night after night, skunks came and ate refuse from the ground in the same coop.

Hunters, finding the nest of a game bird despoiled of its contents, are very likely to attribute it to a skunk, without sufficient evidence. Most people who have been much in the woods believe that skunks eat many birds' and turtles' eggs; but thus far I have been able to find but one man who has *seen* the skunk eating birds' eggs. This may be mainly because the skunk usually hunts at night; but Mr.

* "Squirrels and other fur bearers," John Burroughs, p. 87.

Martin L. Sornborger writes from Haydenville that he has actually seen the skunk eating the eggs in a grouse's nest. He also says he has found the remains of young birds in the stomachs of some skunks that he has examined.

Other Minor Enemies.—Three observers each report snakes, pheasants and orioles as destructive to young birds. The black snake is a deadly enemy to birds, and eats the young in nests both on the ground and in trees. Other species of snakes are probably less destructive.

The introduced pheasant (*Phasianus torquatus*) is reported as killing young chickens and game birds, but the evidence against it is circumstantial, and not very strong.

Orioles are reported as tearing down the nests of other birds and destroying the eggs,—a trick of which a few individuals are undoubtedly guilty.

Raccoons, being nocturnal, omnivorous and fair climbers, are probably destructive wherever they are common; but there is little evidence against them as destroyers of birds, and they are no longer numerous in many parts of this State.

A DISCUSSION OF SOME SUGGESTIONS FOR THE BETTER PROTECTION OF BIRDS.

In reply to the request to suggest means for the better protection of birds, several hundred suggestions were received, which may be classed under forty-six different heads. Those which appear to be of sufficient importance to merit discussion are arranged below, and for convenience classed under four principal heads.

1. *Suggestions regarding Education and Moral Suasion.*

PROPOSED MEASURE.	Number advocating it.
Educate the children in regard to birds, and interest them in their lives.	26
Arouse an interest in the public generally in these matters,	1
Arouse the Massachusetts patrons of husbandry to act on bird protection.	1
Form clubs under the auspices of the League of American Sportsmen.	1

2. *Suggestions regarding the Enactment and Enforcement of Legislation to regulate Shooting.*

PROPOSED MEASURE.	Number advocating it.
<i>(a) General Measures.</i>	
Enforce the laws now on the statute books,	25
Demand more stringent laws,	10
License all shooters,	10
Establish a close season on all game birds for three years,	6
Establish a close season on all game birds for five years,	3
Establish a close season on all game birds for ten years, .	3
Shorter open seasons,	4
Stop all spring shooting,	5
Prohibit the use of bird dogs,	5
Have owners of land post notices forbidding trespassing,	4
Prevent sale of all game birds,	3
Stop all collecting for scientific purposes,	3
Provide heavier penalties,	2
Limit the number of birds to be taken in a day, . .	2
Forbid all shooting by aliens,	2
Forbid use of all live decoys,	2
Regulate bird shooting in the Southern States, . .	2
Forbid all bird shooting by boys,	1
Forbid use of automatic guns,	1
<i>(b) Measures relating to the Fish and Game Commission.</i>	
Larger appropriations for the commission,	6
Appoint more paid deputies,	19
A law giving the right of search without warrant, . .	7

3. *Suggestions regarding Bounty Legislation.*

PROPOSED MEASURE.	Number advocating it.
Offer State bounty on the heads of cats,	20
Offer State bounty on the heads of foxes,	16
Offer State bounty on the heads of crows,	11
Offer State bounty on the heads of hawks, or certain hawks.	10
Offer State bounty on the heads of English sparrows, .	10
Offer State bounty on the heads of owls,	8
Offer State bounty on the heads of weasels,	8
Offer State bounty on the heads of skunks,	7
Encourage in every way the hunting of birds' natural enemies.	3

4. *Miscellaneous Suggestions.*

License cats,	11
Kill off the jays,	5
Kill off the red squirrels,	4
Put bells on cats,	1
Confine cats when birds are learning to fly,	1
Put wire collars on trees, to keep off cats,	1
Plant food plants and shelter plants for birds, . . .	1
Give better protection from forest fires,	1
Establish State reservations where birds will be protected,	4
Appoint judges who will fine people for illegal shooting,	1
Prevent spraying trees,	1
Stop immigration from Italy,	1
Protect birds from English sparrow,	1

Educational Work.

We must awaken an enlightened, all-pervading public sentiment in favor of bird protection; then there will be no difficulty in enacting legislation and taking measures which will prevent the extirpation of our native species of birds. Until this is done, all laws for the protection of birds will be more or less inoperative; no law will be generally respected or can be fully enforced. The citizen must understand that the bird is the property of the State, and must take a lively interest in its preservation, guarding its existence as he would that of his own domesticated animals. He should also have an abiding interest in its life, its propagation, its food and its enemies. Such an interest must be awakened first in the school children, for every sane, normal child has the instincts of a naturalist. Children should be taught not to skin birds or collect their eggs, but to build bird-houses, furnish materials for building nests, feed birds, and attract them about the home. They should be taught the usefulness of birds as destroyers of injurious insects and noxious mammals. They should be taught also to plant shrubs and trees that will furnish the birds food and protection. It is noticeable that twenty-six people suggest that children be taught to value birds. The importance of this measure is becoming generally appreciated. The fact that so many observers have reported the slaughter of birds by boys with guns and air rifles, and the collecting of birds' eggs by children, indicates that bird-study is not properly taught among the children in some localities. Many observers report, however, that in their sections there is little birds-egging or shooting of birds by boys; and it seems to be quite generally believed that this is due to an increased interest in the living birds, caused by such influences as the work of the Audubon Society, and that of the Society for the Prevention of Cruelty to Animals, by nature study in the schools, by humane education and by a general public interest in these subjects. No one can deny that a great change in public sentiment regarding birds already has begun.

The reduction in the amount of native birds' feathers worn as millinery ornaments and the falling off in the traffic and business of taxidermists are among the visible results of the change of sentiment, which has been wrought largely through the influence of the Audubon Society.

An increased interest in animated nature was aroused and fostered more than twenty-five years ago in the State by the Boston Society of Natural History and the Worcester Natural History Society. Nature study has grown in popularity in many States ever since. Massachusetts has kept well on the crest of the great wave of interest in animated nature which has swept over the country. This movement will result in lamentable failure, unless it protects from extirpation those plants and animals the study of which is one of its chief reasons for existence. The work of the American Ornithologists' Union has accomplished more for the protection of sea birds and shore birds on their breeding grounds than that of any other organization. It is due to this work that gulls, terns, other sea birds and shore birds breeding along both coasts of the United States have been saved from decimation or extirpation at the hands of gunners, milliners, hunters and egggers. This work has now been transferred to the recently organized National Association of Audubon Societies.

Every member of the State Board of Agriculture, every branch of the League of American Sportsmen, every natural history club or society, every Agassiz chapter, every grange of the Patrons of Husbandry, every sportsmen's organization, should give active support to all measures that will help to maintain or increase the numbers of useful insectivorous birds, game birds, shore birds and wild fowl, and all should hold up the hands of the United States Biological Survey in securing consistent State laws to protect the birds during their migrations both north and south. The publication and distribution of literature regarding the usefulness of birds and the necessity for their protection should be undertaken by all such societies. The public press can help much by printing short articles on these subjects.

*Suggestions regarding the Enactment and Enforcement of
Legislation against Excessive Hunting and Shooting.*

Twenty-five correspondents urge the enforcement of the laws now on the statute books as the sovereign remedy for all ills now apparent. These statutes are certainly wise in the main, but some of them are not sustained by public sentiment, and therefore are not respected. Such is the law forbidding Sunday fishing. Sunday hunting also is quite freely indulged in, in localities where the deputies of the Fish and Game Commission are not at hand to enforce the law. Local authorities do little to enforce the game laws. Legislatures, while giving fish and game commissions full authority to enforce the law, usually hamper its enforcement by granting inadequate appropriations; so that such commissions are obliged to depend much on the services of unpaid officers, who can devote comparatively little time to their ungracious and thankless task. Notwithstanding this handicap, the officers of the Massachusetts Fish and Game Commission secured fifty-five arrests in 1904 for infractions of the Sunday law. The fines paid amounted to six hundred and ten dollars, and only nine cases were discharged or filed.

Notwithstanding the fact that the Massachusetts commissioners have been very efficient, and are now enforcing the law better than ever before, fifty-eight persons report that the laws are either indifferently enforced, or not enforced at all, in their sections; fifty-seven, however, report that they are well enforced; thirty-two say "fairly well;" and nineteen "as well as possible under the circumstances." Some report that the laws are "respected" in many of the country towns. The farming population of Massachusetts is generally a law-abiding class; but the laws would be better respected if better known. If every farmer in the Commonwealth could have mailed to him a printed copy of the bird and game laws, there would be fewer infractions of these statutes by the rural population. Probably not one person in ten knows these laws. All hope of any better enforcement of the bird laws by this commission lies in the direction of making the force of wardens larger and more

efficient. The Fish and Game Commissioners are authorized, empowered and directed to enforce the fish and game laws of the State; this they are now doing as well as they can, with the limited means at their command.

Six reports advocate *giving the officers of the commission a right to search suspected persons in the field without procuring a warrant*. Such an enactment may not be constitutional, but is greatly needed. Every citizen who believes in the protection of our game birds and song birds should favor such a law. It would help greatly to stop ferreting, killing game birds out of season, and the shooting and trapping of the smaller birds by boys and foreigners.

A large number of correspondents demand *more stringent laws* than those now on the statute books. A close season of from three to ten years on all game birds, ducks and shore birds, as advocated by twelve correspondents, would undoubtedly help the birds; this is the only certain way to check the extirpation of the shore birds. But this plan might be opposed by nearly all sportsmen and shooters generally, and there is little hope of its adoption until such time as the danger of exterminating the birds shall become patent to every one. Shorter open seasons no doubt would help; but, unless the season is made of uniform length for all game birds, it is rather ineffectual to shorten the season on one species, for when men are in the field with guns in their hands, all game birds will be shot.

Five correspondents advise *the stopping of all spring shooting*. This is the most important measure yet proposed which seems to have any hope of success. If *all spring and summer shooting could be stopped* throughout the United States and Canada, we should be nearer the solution of the problem of bird protection than we shall be likely soon to get in any other way. The laws of Massachusetts already protect the partridge, woodcock, quail, wood duck, black duck, teal, plover, snipe, rail and marsh or beach birds in spring; but plover, snipe, rail and marsh or beach birds may be killed after July 15. This summer shooting must be stopped eventually. The river ducks should all have the same protection in spring that is now given to black duck,

wood duck and teal; and it would be wise to forbid all spring and summer shooting of water-fowl. A moderate amount of shooting in the fall, after the birds have bred, does not reduce their average numbers perceptibly from year to year; but spring shooting tends toward extermination.

When we have done what remains to be done in Massachusetts, some influence must be brought to bear on other States; for, if the birds are shot on their way north through the southern and middle States, and also in Nova Scotia and Newfoundland, protection here will have only partial results. The Province of Quebec protects shore birds in spring in most of her territory; but Nova Scotia laws now give shore birds, except snipe, no spring protection. New Brunswick protects them on a large part of her coast. All the New England States excepting Rhode Island now prohibit the shooting of shore birds during one or more of the spring months, but the laws of the different States do not coincide. Massachusetts leads the New England States by protecting practically all shore birds in spring. New York protects them in spring and summer. New Jersey protects shore birds from January 1 to May 1. Maryland and Delaware give them no adequate spring protection. Virginia protects most of the shore birds in spring. In New Hanover County, North Carolina, shore birds may be shot from September 1 to April 1. In South Carolina, Georgia and Florida they are practically unprotected.

If the laws of all these States could be so amended as to prevent any shooting of the shore birds from January 1 to September 1, we might expect to see a resultant increase among those birds which, like the black-bellied plover, migrate mainly up and down the coast. Such a law, however, would not greatly affect such species as the Eskimo curlew, the golden plover and the Bartramian sandpiper or upland plover, which migrate north through the interior, as the abundance of these birds is governed to a considerable extent by the amount of spring killing done in the Mississippi valley States. Some States in this region give these species no protection in the spring. The laws

of Wisconsin, Louisiana, Michigan, Minnesota, Missouri and Ohio, however, now protect plover either partially or wholly from spring shooting.

In regard to legislating against spring duck shooting, Massachusetts, in protecting only wood duck, black duck and teal, from March 1 to September 1, is already behind New Hampshire, Vermont, Ohio, Michigan, Wisconsin and Minnesota; for these States prohibit all, or nearly all, duck shooting during most of the winter and spring months. New Brunswick prohibits the shooting of wood duck, black duck, Brant, teal and geese between December 2 and September 1. Nova Scotia, however, protects only "blue-winged duck," teal and wood duck in spring. The Province of Quebec protects all wild duck except sheldrake in much of her territory from March 1 to September 1, while Ontario sets an example, which we may well follow, by protecting all ducks from December 16 to September 1. Newfoundland, Maine, New Hampshire, New York and Georgia protect either some or all ducks, beginning at a date before April 1.* With the exception of the States named, not any Atlantic Coast State or Gulf State protects ducks, except wood duck in Virginia and Louisiana, before the first of April.† If all ducks and shore birds which migrate south could be protected there and along their routes of migration after the first day of January, and also throughout the spring and summer, both in migration and on their breeding grounds, it seems probable that the diminution in their numbers might be checked. If all organizations interested in the protection of birds or game would work together for this end, it might be accomplished.

The *prohibition of the use of bird dogs*, if it were possible, would undoubtedly save many birds, for some men would be unable to find birds were it not for their dogs. But dogs will be used so long as birds are shot for sport or market. They ought, however, to be confined during the breeding

* Farmers' Bulletin No. 207, "Game laws for 1904," by T. S. Palmer, Henry Oldys and R. S. Williams, Jr., of the Biological Survey, United States Department of Agriculture.

† This applies also to certain counties of North Carolina and Alabama.

season of the birds, that they may have no opportunity to destroy the eggs or young.

Posting Land. — Owners of land will accomplish little in the way of bird protection by merely posting notices forbidding trespassing or shooting, for many shooters pay little attention to such notices. They are useful, however, where there is a man to patrol the land posted, and see that shooters keep off, for notices define the limits of the guarded land, and serve as a warning to all trespassers.

The *prevention of the sale of all game birds taken in the State*, which is advocated by three persons, is a wise measure, and one which must be undertaken sooner or later, *unless* other measures are adopted to save the game. The amount of native game marketed here has greatly decreased already. Our marketmen are now obliged to send to Europe, the Antilles and other regions to secure a supply of game for home consumption. Over forty States and Territories already prohibit the sale of either a part of or all the game taken within their limits. All the British North American Provinces prohibit the sale of certain animals or game birds, or both. Massachusetts is behind the leaders in this movement. She must eventually stand with Arkansas, Colorado, Hawaii, Michigan, Minnesota and Texas, which forbid the sale of all, or nearly all, birds protected by the laws. Eventually poultry and pigeons, or artificially propagated game birds, and water-fowl, raised by our farmers and poultrymen, probably will largely take the place in our markets so long filled by wild game birds.

Heavier penalties for infractions of the game laws might be provided, and perhaps would cause them to be more generally respected.

A law limiting the number of birds to be taken in a day is in force in several States, and may be of some service with conscientious sportsmen, but it is difficult of enforcement.

To forbid the use of live decoys would help to protect the water birds. The arguments for such a law will apply with less force to decoys of all kinds; but there are many difficulties in the way of enacting or enforcing such laws.

The use of the automatic gun should be prohibited. No one who regards the protection of game as important should ever use one.

Those who wish to *forbid all shooting by boys and aliens* are right; unquestionably this should be done. There should be an age limit for shooters, and the aliens who, boylike, shoot at nearly every wild thing they see, should be stopped from carrying arms altogether.

Hunting Licenses. — Possibly both these classes might be shut out largely by licensing all shooters. Apparently the license has now come to this country to stay. In a recent bulletin, entitled “Hunting licenses, their history, objects and limitations,”* Dr. T. S. Palmer of the United States Biological Survey gives a history of the hunting license in this and foreign countries. The license not only furnishes money for the enforcement of the law by paid wardens, but it also increases the interest of the citizen in its enforcement. A man who has paid a liberal license fee is not likely to encourage others in hunting without a license. The amount received from licenses may be considerable. Maine collected last year more than twenty-five thousand dollars; Wisconsin, ninety thousand dollars; and Illinois, nearly one hundred thousand dollars. Massachusetts could never hope to reach these figures, but she might succeed in preventing hunting or shooting by many non-citizens and non-residents through a high-license system discriminating against them. Here, however, we are met by the objection that such an act would be unconstitutional; but this is a question to be decided by the courts. The imposition of a license is nothing new. One of the earliest license laws passed in this country was enacted in Virginia in April, 1691. In the early part of our history such laws were few and perhaps unnecessary; but within the last twenty-five years their necessity seems to have become apparent, and within ten years their number has increased rapidly. They are now in force in thirty-five States and Territories in this country, and also in the seven provinces of Canada. Many foreign

* Bulletin No. 19, United States Department of Agriculture, Division of Biological Survey.

countries have long had hunting licenses. In England a man must have a gun license, a hunting license, a license to use a hunting dog, and even, in some cases, a game keeper's license also. In America a resident is usually taxed one dollar, while a non-resident is required to contribute from ten to one hundred dollars.

The main objects of hunting licenses are two: (1) to limit shooting, especially on the part of non-residents; (2) to raise money for game or bird protection. The license tends to preserve the game of the State for the benefit of its own people, to whom it is held to belong. The utility of the license may be gathered from the fact that ten States licensed more than a quarter of a million hunters in 1903. The license has the advantage that by it the owner may be positively identified. It may contain his description and photograph, and he may be obliged to produce it at the request of any citizen. While I would not be understood as advocating any particular license law, it seems to me that the subject is worthy of careful consideration.

The following extract from a letter from Dr. T. S. Palmer of the Biological Survey of the United States Department of Agriculture, who has charge of the matter of game preservation, shows clearly the measures that he advocates to protect the birds: "The decrease in certain species of birds is not difficult to explain, and it is attributable largely to long open seasons and open markets. Comparatively few States afford shore birds any real protection, the seasons often being open during the height of the migration season, and closed when the birds are absent from the State. The exemptions in some of the laws, allowing practically unrestricted sale of birds taken outside the State, place a premium on the destruction of birds in States where the laws are lax. Fortunately, since the passage of the new law last spring, sale in Massachusetts is now prohibited during the close season, though the privilege of storing game and holding it in possession from one season to another still invites wholesale destruction of game birds for market purposes elsewhere. The destruction of non-game birds is not due to lack of protection so much as to failure to deal effectively

with certain special conditions which have recently arisen. The remedy for present conditions is clear, but difficult to apply; namely, to prohibit spring shooting, to restrict the sale of game birds, and to prevent market hunting and indiscriminate slaughter of game and small birds. The destruction of birds by foreigners has thus far assumed a serious aspect in only a few States. The most successful means of dealing with it thus far suggested is a ten-dollar hunting license required of all foreign-born unnaturalized residents of the State. Such a law has been adopted in both Louisiana and Pennsylvania, and has thus far proved quite satisfactory."

Bounty Laws.—Sufficient protection will be given to birds against their natural enemies by the shooters themselves, when they learn what protection is needed. All gunners will shoot the Cooper and sharp-shinned hawks at sight, when they know them and know their character. They will also shoot cats, foxes, crows, squirrels and all the enemies of birds indiscriminately, whenever they recognize them as enemies. Hence, so long as we allow the shooting of game, the shooters are likely to keep the enemies of birds within reasonable limits. Crows, foxes and bird-hawks may increase in some cases, owing to their well-known ability to take care of themselves; but the law does not protect any of these creatures, and they may be kept in subjection without the stimulus of bounty laws. Bounty laws may have been wise and even necessary in the early history of this Commonwealth, when there were wolves, bears, panthers and rattlesnakes to be exterminated; now, however, they are in general unwise, unnecessary, uncalled for, and in effect positively injurious.

We must admit that such laws operate to reduce the numbers of the animals proscribed by them, provided the bounty is made sufficiently large. It is perfectly clear that any animal, the destruction of which will put much money into some one's pocket, is doomed to the same kind of persecution as was the game before it was protected by law. The result of this kind of persecution is patent to all; and if a heavy uniform bounty on any one animal could be paid

throughout the continent, it would be, in time, either exterminated or rendered so rare that hunting it would be unprofitable. Admitting that such bounty laws, if uniformly adopted, would be effective, let us first see why their results are, in general, pernicious.

The main object of all bird legislation is to protect the birds. This can be done by restricting both the number of shooters and the time during which shooting is allowed. Bounty laws have precisely the opposite effect. They encourage boys, foreigners and unemployed persons to roam with guns in their hands through the woods and fields at all seasons of the year. This is sure to result in the destruction of game birds and insectivorous birds at all seasons, to say nothing of the poultry and other property of the farmers that, perforce, must suffer. Probably every State that has offered bounties in recent years has had this experience.

Bounty laws always put a premium upon dishonesty. Under the so-called scalp act of 1885, in Pennsylvania, upwards of two thousand dollars were realized for a buffalo hide and a mule skin in one county, by a party of hunters. These hides were cut up and "fixed" to resemble the scalps or ears of predatory mammals. Whether the magistrates also were "fixed" is not recorded. A red fox was slain in one of the mountainous districts and its pelt cut into sixty-one parts, for which the hunter received sixty-one dollars. Bounties were paid on the heads of domestic fowls, grouse, cuckoos, and even English sparrows, which were supposed to have been palmed off on the authorities as the heads of hawks and owls. Birds and mammals were killed in other States and shipped into Pennsylvania, and large amounts of money were thus fraudulently obtained.* This but repeats the history of local and State bounty laws everywhere.

A bounty on cats, foxes, crows, hawks, owls, English sparrows, weasels and skunks would be very expensive to the State. Pennsylvania paid out during one year not less than one hundred and fifty thousand dollars for bounties on birds and mammals. Montana paid out within six months in 1887

* "Birds of Massachusetts," Dr. B. H. Warren, annual report Massachusetts State Board of Agriculture, 1890, p. 45.

more than fifty thousand dollars in bounties for ground squirrels and prairie dogs. As at that time these animals had not decreased perceptibly, a special session of the Legislature was called to repeal the law, lest it bankrupt the State.

While the effect of bounty laws, in general, is bad, the practical operation of laws directed at particular species is certainly vicious. We may regard a bounty on the heads of cats as impracticable, for obvious reasons, not the least among which might be the encouragement of a new industry, — the raising of kittens for the bounty. A bounty on cats, foxes, weasels and skunks would encourage trapping, which is already exterminating some of the smaller fur-bearing animals. The experience of States which have placed bounties on the head of the English sparrow has not been encouraging. These acts are said to have resulted in a slight decrease of the sparrows, and the destruction of great numbers of native birds killed and ignorantly offered for bounty. To put a bounty on the head of the sparrow is practically equivalent to offering a bounty on all our native sparrows, many of the warblers, the thrushes, wrens and a few other species. Anything that at a distance looks like a sparrow would be killed, and probably in most cases the bounty would be paid, unless a competent naturalist could be appointed in each town or county seat to pass on the heads.

If we offer a bounty on the crow, most of our native crows which do the mischief probably will escape, and the bounty will be paid mainly on birds that came from the north in winter. The difficulty of killing crows in the summer prevents many being taken at that time. In the winter most of the crows that summer here probably go farther south, their places being taken by crows from farther north. It is at this time that crows are most readily killed, either by baiting or at their roosts; and therefore most of the crows offered for bounty would be those which never do any injury here, while the guilty ones would escape.

A bounty on hawks or owls would work injury to the agricultural interests. Hawks, with a few exceptions, are useful birds. Owls, being probably among the most useful of all birds, should be protected by law, rather than pro-

scribed. When in 1886 the people of Pennsylvania became aware of the injurious effects of the scalp act, Dr. C. Hart Merriam, then ornithologist and mammalogist of the United States Department of Agriculture, his assistant, Dr. A. K. Fisher, and Dr. B. H. Warren, examined over three hundred and fifty stomachs of the hawks and owls killed under the act. Ninety-five per cent of the food materials of these birds was found to consist, not of poultry and game, but of "mice and other destructive mammals, grasshoppers and many injurious beetles." Dr. Merriam says, in his report for 1886: "By virtue of this act, about ninety thousand dollars has been paid in bounties during the year and a half that has elapsed since the law went into effect. This represents the destruction of at least 128,571 of the above-mentioned animals, most of which were hawks and owls. Granting that five thousand chickens are killed annually in Pennsylvania by hawks and owls, and that they are worth twenty-five cents each (a liberal estimate, in view of the fact that a large proportion of them are killed when very young), the total loss would be \$1,250, and the poultry killed in a year and a half would be worth \$1,875. Hence it appears that in the past eighteen months the State of Pennsylvania has expended \$90,000 to save its farmers a loss of \$1,875. But this estimate by no means represents the actual loss to the farmer and the tax payer of the State." Dr. Merriam then goes on to show the vast loss that must result to the people of Pennsylvania, who, by killing these hawks and owls, have saved the field mice and other harmful creatures on which the birds otherwise would have preyed. The Legislature of Pennsylvania appointed a State ornithologist, and repealed the scalp act. We do not need a "scalp act" in Massachusetts.

Dukes County and the town of Lakeville now pay bounties on hawks and owls. This unwise policy should be discontinued. There are many sections in eastern Massachusetts where hawks and owls are becoming rare. During the winter of 1903-04 many farmers had their young fruit trees ruined by the mice, which ate away the bark. If this continues, a demand for the protection of hawks and owls

is sure to come. The placing of a bounty on the few injurious species of hawks has been proposed. No such measure should be enacted, for it would result in the increased killing of all hawks. Moreover, our present law, allowing the destruction of *all* hawks and owls, is in this respect wrong, and should be modified.

Control of the Cat. — As it is almost universally admitted that the cat is one of the greatest enemies of birds, many suggestions have been offered in regard to controlling the pest. The law which prohibits a man from killing certain birds at all times does not prohibit him from keeping any number of cats, and allowing them to run at large, not only killing these same birds, but torturing them as well. In this respect our game laws and bird laws are farcical. But what remedy shall we provide? The cat license finds the most advocates. If a license fee of two dollars or more were demanded for each cat, and a penalty provided for failure to comply with the law, the number of cats soon would be reduced. This would be a distinct advantage. Every man, however, would have to be a self-appointed officer to kill all unlicensed cats, while the licensed cats, being protected by law, would continue to roam the fields and woods with impunity, killing far more birds than licensed dogs do now. With cats unlicensed and in too many cases uncared for, as at present, every sportsman or gunner who is out after game should shoot every cat he sees running at large in the woods. A box trap baited with catnip will capture a large number of cats in the course of a year. This protective device is used by breeders of pheasants and by poultrymen. I have described some cat-proof fences and other devices for protecting birds against cats, in a bulletin on methods of attracting and protecting birds, to be issued by the Hatch Experiment Station at Amherst, Mass.

The suggestion regarding the planting of trees and other plants that will provide both food and shelter for the birds is a good one, which is also treated at some length in the bulletin above referred to.

The Establishment of State Parks for the Preservation of Forests and Game. — This is a policy that is already attract-

ing the attention of the national government and many of the State governments. A protected natural park provides an asylum in which birds can find security from their greatest enemy, man. Here they can find breeding grounds where they will be comparatively unmolested, when, elsewhere, destruction awaits them at every hand. New York State, with her great Adirondack Reservation, has recently established another in the Catskills. Massachusetts already has several reservations of small area. These might be increased in number, and larger tracts of wild land taken. Men of wealth should follow the example of Mr. Corbin, in New Hampshire, and buy up tracts of hill land for the preservation of the forests and the game. In such preserves no shooting of game or birds should be allowed. If birds were protected also against their natural enemies in many preserves of this kind, the supply would be constantly renewed. One or more reservations might be established on our coast for the benefit of water-fowl and shore birds. Parts of Nantucket, Chatham, Monomoy, Wellfleet or other places on Cape Cod, the Ipswich marshes, or some similar resorts of water-fowl and wading birds, might be secured in time to perpetuate the natural features of these bird resorts, and afford the fowl safe feeding ground, upon which they could remain undisturbed indefinitely. We have thus far secured only a few of the beaches near Boston, and these are so frequented by people that most of the birds are driven off; still, a few shore birds may now be seen occasionally along Nahant Neck.

Protection for the Smaller Species that are diminishing. — That portion of the Massachusetts statutes which applies to the smaller birds is very nearly perfect; they are nearly all protected at all times. The unprotected species hardly deserve protection. If the law can be properly enforced, the birds are safe except as they may be interfered with by the changes which take place around the centres of population. The erection of buildings, the laying out of streets, the cutting of trees and shrubbery, the draining of meadows and similar "improvements," the building of trolley roads and telegraph lines, all inimical to bird-life, cannot be helped.

It is probable that in spite of all these agencies the smaller birds can maintain their numbers outside of the immediate influence of the cities. But the question still remains, what shall we do to help the few species that are evidently diminishing under protection?

Of these species, the purple martin is now at the lowest ebb in point of numbers, and most needs such assistance as we may be able to give it in re-establishing itself. I have learned by a voluminous correspondence that many of the empty bird-houses were visited either in spring or fall by migrating martins. In this correspondence one significant fact appeared. Very few people had taken the trouble to clean out the martin-boxes, and remove the old nests, rubbish and dead birds. Mr. Fred B. Pike of Cornish, Me., writes that many of the bird-houses in that region were "full of dead birds from last year's storm," and the martins did not go into them to breed; but in his bird-house, in which there were no dead birds, the martins bred as usual. Mr. Herbert Moulton, Hiram, Me., writes that he took his bird-house down in the spring (1904) and cleaned it out, finding five or six dead birds in some of the rooms. He then put the house on a pole thirty-five feet high, and it was occupied by twelve birds, among which were three females, which raised large broods, thus re-establishing the colony. Not one of the other bird-houses in the vicinity was occupied. If every one owning a martin-box would clean it out annually before the last week in April, the chances of the birds' re-establishing themselves might be bettered. The English sparrows must be kept out of the houses, for when they once get the rooms filled with their bulky nests and pugnacious bodies, the few martins now left will have little chance for a home.

Mrs. Mary R. Stanley writes from North Attleborough of a plan which she thinks will keep out English sparrows from martin-boxes. She speaks of some old dwelling houses where holes underneath the jet were made, affording the birds access to the space under the eaves. These, she says, were used by martins, and have never been used by the sparrows. She suggests making martin-boxes with all the

entrances underneath, and without perches, believing that the sparrows will not enter them. The experiment might be worth trying, for every promising means should be used to entice migrating martins to remain and breed. Every householder suitably located should put up at least one small martin-box on a pole not less than twenty feet high. Then, whenever the martins north or south of Massachusetts have a good breeding season, we shall be ready to take care of the overflow.

Barn swallows may be fostered by keeping the old-fashioned barns and sheds open (or at least one open window in each). Round or rough-hewn rafters furnish supporting points for their nests. Small blocks nailed up on modern squared rafters, or slats nailed across them, will assist these swallows in building. The eave swallows may be helped by nailing a rough board on the outside of the building, about a foot below where the eaves or jet meet the wall. The only nest of this species that I saw in Bristol County last year was built on the ledge over the door of a painted barn.

Tree swallows need no assistance beyond being supplied with an abundance of small nesting-boxes, widely separated and put up on poles or trees. If the English sparrow can be kept away from the nesting-boxes, the swallows will breed well.

We may help the house wren a little by putting up small nesting boxes with the entrance hole no larger than a silver quarter. The small size of the entrance probably will serve to keep out the sparrow.

The mourning dove is now fully protected by law, at all times, in Maine, New Hampshire, Massachusetts, Vermont, Rhode Island, Connecticut, New York, New Jersey, Delaware, the District of Columbia and Virginia. In the other Atlantic Coast States it is still on the game list. On one occasion in 1904 in Concord I saw twelve birds flying up a meadow. A single shot was fired at them by some one, and the flock came back; but there were only eleven birds remaining. The laws which protect this species at all times are comparatively recent, and are not as yet generally known

and respected. These doves are always shot without restraint in fall and winter in the southern States. They must be given better protection both north and south, as they appear to be decreasing quite generally.

RECAPITULATION AND CONCLUSION.

The Decrease of Species.

1. The action of the elements in 1903-04 was very disastrous to three species only,—the purple martin, the bob-white or quail, and the long-billed marsh wren. The sportsmen are making an effort to restock the covers with quail, but they meet with indifferent success in obtaining birds. The martins appear to be nearly extinct in the breeding season; only a few pairs are left in a few localities. The marsh wrens appear to be nearly exterminated or driven out locally. The chimney swifts suffered greatly, and the swallows to a less degree; Carolina rails and Virginia rails also suffered much. Other species suffered much locally and some quite generally, but a good breeding season in 1904 has done much to efface the effects of the storms.

2. The accounts of early historians show that game birds, water-fowl and shore birds were wonderfully abundant during the settlement of Massachusetts. Since then at least six species have disappeared, and several others are nearly extirpated or driven out,—some quite recently. Among the latter are the long-billed curlew, the Eskimo curlew, the golden plover, the lesser snow goose and the passenger pigeon. The wood duck, the Bartramian sandpiper or upland plover, the knot and the dowitcher are also disappearing rapidly.

The river ducks have decreased steadily, but the bay and sea ducks are still numerous, with few exceptions. Shore birds generally have lessened in number about 75 per cent within the memory of living men.

Eagles appear to be rare or decreasing in nearly all sections. The larger hawks and owls have diminished much in most of eastern Massachusetts; but the decrease of hawks and owls has been only local in the central and west-

ern parts of the State, where they are generally at least holding their own.

Great blue herons probably rarely breed now in the State, and other herons seem to have diminished somewhat generally, although in some sections their numbers seem subject to little change. The night herons have recently increased in numbers where the heronries have been protected.

Crows, while fluctuating much, have generally held their own, and in many sections have increased in numbers. Mourning doves have decreased, and are generally rare or wanting except in some eastern sections. There are some indications, however, that they may be increasing now in a few localities.

The smaller native birds fluctuate, some species decreasing in some localities and increasing in others, but apparently holding their own very well, in general. There may be a slight decrease in the aggregate, owing to the evident diminution of many species in and near the cities, with no corresponding increase in the country. There appears to be no general and noticeable reduction in the rural sections except where the birds are subjected to an unusual amount of persecution. On the whole, the balance of life among the smaller birds seems to be fairly maintained.

Swallows seem to have diminished somewhat generally, but more especially in and near the cities and larger towns. In the rural districts the cliff, or eave, swallow shows the greatest diminution, and the tree swallow the least.

Nighthawks have decreased much sectionally. The house wren has become very local, and is now rare or wanting in most localities where it was formerly common. The red-headed woodpecker has practically disappeared as a summer resident. On the other hand, the rose-breasted grosbeak now occupies more territory than formerly, and the robin and bluebird have increased within a few years.

Information received from other States along the Atlantic seaboard seems to indicate that, as here, shore birds and game birds are decreasing, while the insectivorous birds are, with some exceptions, holding their own.

The Chief Causes of the Reduction in Birds' Numbers.

Most important of all is man, — sportsmen, Italians and other foreigners, bird shooters and trappers, market hunters, boy gunners, egg collectors, and certain changes incident to an increase of population.

Secondary Causes of Bird Diminution.

Natural Enemies.—These do not, under natural conditions, reduce the numbers of birds, as they protect the species on which they prey; but certain introduced species have become very harmful. The domestic cat and the English sparrow (the sparrow in particular) are mainly responsible for the disappearance of swallows, wrens and other species near the cities. The sparrow, while not now increasing in or near Suffolk County, seems to be increasing and spreading in the country districts. If this continues, a further diminution in the numbers of native birds is likely to result.

Native natural enemies of birds may become harmful when protected by man from their own enemies. We have protected crows and foxes in some measure by destroying the larger birds and mammals which fed on them, and they have become numerous enough in some localities to be injurious to the already reduced game birds and the song birds.

Suggestions for the Better Protection of Birds.

First and most important, teach the people the economic value of birds, and show the consequences that are likely to follow their extirpation. This should begin in the schools, by interesting the children in the lives of birds, teaching their usefulness, and how to feed, shelter and protect them. The children should also be instructed in regard to the laws protecting birds, and be taught to respect them. The bird and game laws must be enforced, even if it requires larger appropriations for the Fish and Game Commission, with the appointment of more paid deputies. In this connection a law licensing shooters, the license fees to be applied to the enforcement of the game laws, may be worth considering. The officers of the Fish and Game Commission should be

given the right to search suspected persons. Until such a measure is enacted, the game laws can never be enforced as they should be.

Those birds which, like the wood duck, are disappearing, should be protected at all times by law. All spring and summer shooting of wild-fowl and shore birds should be, and eventually must be, prohibited by law.

If it shall be found that these measures do not give sufficient protection, then the sale of all birds from Massachusetts sources must be prohibited. All persons and all associations interested in bird protection should unite to hold up the hands of those who are now working to secure the protection of birds in the south during the winter and spring.

The extirpation of a species usually takes a long time, and only those species which are the objects of special and unremitting persecution throughout their range are likely ever to be eradicated from the country. For this reason, our "song and insectivorous birds," which are here protected by law, will be comparatively safe when the law is fully enforced. But it is not so difficult practically to exterminate or to drive out of a State a migrant or a resident game bird; therefore, the game birds, the shore birds and all others that are readily accessible and are killed for food or sport must now be protected by the most stringent laws, most rigidly enforced, or eventually they will be swept from the territory of this Commonwealth.

APPENDIX.

Massachusetts Correspondents who furnished Information for this Report.

Berkshire County.

Bidwell, Wm. S.,	.	.	.	.	.	Monterey.
Bradley, Alonzo,	.	.	.	.	.	Lee.
Carne, Mrs. Thos.,	.	.	.	.	.	Forest Park, Adams.
Cross, W. J.,	.	.	.	.	.	Becket.
Dewey, Harvey H.,	.	.	.	.	.	New Lenox.
Northup, L. J.,	.	.	.	.	.	Cheshire.
O'Neill, Francis,	.	.	.	.	.	Adams.
Ruberg, L. E.,	.	.	.	.	.	Florida.

Salmon, Timothy B.,	.	.	.	.	.	Richmond.
Snow, W. H.,	.	.	.	.	.	Becket.
Stearns, W. R.,	.	.	.	.	.	Pittsfield.
Van Huyck, J. M.,	.	.	.	.	.	Lee.
Wood, J. H.,	.	.	.	.	.	Pittsfield.

Hampshire County.

Baker, N. B.,	.	.	.	.	.	West Chesterfield.
Brewer, J. L.,	.	.	.	.	.	Pelham.
Brooks, Prof. Wm. P.,	.	.	.	.	.	Amherst.
Eldredge, A. H.,	.	.	.	.	.	Ware.
Fernald, Dr. H. T.,	.	.	.	.	.	Amherst.
Lyman, C. B.,	.	.	.	.	.	Southampton.
Nelligan, Prof. R. F.,	.	.	.	.	.	Amherst.
Nichols, A. W.,	.	.	.	.	.	Chesterfield.
Pratt, A. L.,	.	.	.	.	.	Belchertown.
Richards, F. C.,	.	.	.	.	.	Williamsburg.
Russell, H. C.,	.	.	.	.	.	North Hadley.
Sornborger, M. L.,	.	.	.	.	.	Haydenville.

Hampden County.

Adams, Miss Emily B.,	.	.	.	.	.	Springfield.
Bagg, J. N.,	.	.	.	.	.	West Springfield.
Bemis, R. W.,	.	.	.	.	.	Chicopee Falls.
Clark, E. C.,	.	.	.	.	.	Wilbraham.
Fairfield, Mrs. S. L.,	.	.	.	.	.	Monson.
Healey, M. C.,	.	.	.	.	.	Thorndike.
Hendrick, J. H.,	.	.	.	.	.	Springfield.
Luman, J. F.,	.	.	.	.	.	Palmer.
Marsh, Daniel J.,	.	.	.	.	.	Springfield.
Morris, Robert O.,	.	.	.	.	.	Springfield.
Rogers, F. D.,	.	.	.	.	.	Monson.
Sanford, Mrs. Fred. A.,	.	.	.	.	.	Westfield.
Scott, F. H.,	.	.	.	.	.	Westfield.
White, C. A.,	.	.	.	.	.	Ludlow Centre.

Franklin County.

Allen, Thos.,	.	.	.	.	.	Bernardston.
Ballard, Daniel,	.	.	.	.	.	Millington.
Cushman, R. H.,	.	.	.	.	.	Bernardston.
Howard, Anson O.,	.	.	.	.	.	East Northfield.
Nims, Miss Clara W.,	.	.	.	.	.	Greenfield.
Russell, Chas. C.,	.	.	.	.	.	Greenfield.
Smith, A. A.,	.	.	.	.	.	Lyonsville.
Swann, H. W.,	.	.	.	.	.	Shelburne Falls.
Wells, H. A.,	.	.	.	.	.	Deerfield.
Woffenden, F. W.,	.	.	.	.	.	Rowe.

Worcester County.

Allen, Jesse,	Oakham.
Anderson, Geo. M.,	Worcester.
Bothwell, Ethan,	Northborough.
Carkin, Geo. E.,	Royalston.
Casavant, F. S.,	Gardner.
Chase, Guy H.,	Princeton.
Churchill, Miss Abby P.,	Fitchburg.
Durgin, W. F.,	Hopedale.
Fisher, Dr. Jabez,	Fitchburg.
Gibson, C. O.,	Fitchburg.
Hall, Rufus C.,	Webster.
Hodge, Prof. Clifton F.,	Worcester.
Holden, Wm.,	Leominster.
Ingalls, Chas. E.,	East Templeton.
Jefts, A. H.,	Athol.
Kinney, H. R.,	Worcester.
Love, Joseph P.,	Webster.
Mann, Miss J. Ardelle,	Millville.
Martin, J. L.,	Milford.
Perry, Wm. S.,	Worcester.
Proctor, Fred. J.,	Fitchburg.
Prentiss, Wm. N.,	Milford.
Smith, Robert F.,	Uxbridge.
Spalter, Mrs. F. B.,	Winchendon.
Stockwell, S. F.,	Auburn.
Stone, C. E.,	Lunenburg.
Thayer, Col. John E.,	Lancaster.
Tuttle, E. F.,	Uxbridge.*
Warren, D. A.,	Upton.
Whitehead, Geo. E.,	Millbury.
Woodward, Dr. Lemuel F.,	Worcester.

Middlesex County.

Appleton, Miss Augusta I.,	Winchester.
Aspinwall, W. H.,	Chestnut Hill.
Bailey, C. E.,	North Billerica.
Bailey, Dr. J. W.,	Arlington.
Barnard, Mrs. Josephine M.,	Westford.
Brewster, Wm.,	Cambridge.
Comey, A. C.,	Cambridge.
Coolidge, Philip T.,	Watertown.
Douglas, N. B.,	Sherborn.

* Present address, Franklin, Norfolk County.

Frost, H. G.,	Waltham.
Gerry, Elbridge,	Stoneham.
Hagar, Geo. W.,	Marlborough.
Higginson, A. H.,	South Lincoln.
Hill, Miss Elizabeth S.,	Groton.
Hoffman, Ralph,	Belmont.
Holden, Edward F.,	Melrose.
Hornbrooke, Mrs. F. B.,	Newton.
Hunter, W. J.,	Lincoln.
Kirkland, A. H.,	Reading.
Kohlrausch, C. H., Jr.,	Billerica.
Maynard, C. J.,	Newtonville.
Mills, J. I.,	Ayer.
Parker, Samuel,	Wakefield.
Parkhurst, S. W.,	Chelmsford.
Poland, Geo. M.,	Wakefield.
Price, Chas. P.,	Stoneham.
Randall, Walter B.,	Newton Upper Falls.
Robbins, Miss N. P. H.,	Lowell.
Smith, Henry N.,	South Sudbury.
Snow, H. A.,	Marlborough.
Steele, Walter,	Stoncham.
Symmes, S. S.,	Winchester.
Wheeler, C. S.,	Lincoln.
Wickersham, C. S.,	Cambridge.
Wood, E. W.,	West Newton.

Essex County.

Brown, Gilman W.,	West Newbury.
Burney, Thos. L.,	West Lynn.
Chase, H. F.,	Amesbury.
Dodge, F. C.,	Beverly.
Farley, J. A.,	Lynnfield.
Godfrey, H. L.,	Newburyport.
Goodridge, J. W.,	Wenham.
Goldsmith, G. W.,	Beverly.
Knowlton, F. S.,	Wenham.
Loring, Miss K. P.,	Pride's Crossing.
Nichols, Miss Mary W.,	Hathorne.
Nixon, Wm. W.,	Gloucester.
Perkins, C. L.,	Newburyport.
Pickering, Miss S. W.,	Salem.
Pike, B. P.,	Topsfield.
Pitman, James,	Swampscott.
Prescott, Chas.,	Amesbury.
Robbins, Reginald C.,	Pride's Crossing.

Townsend, Dr. Chas. W.,	.	.	.	.	Ipswich.
Webster, Eben,	.	.	.	.	Haverhill.
Wood, Gardner,	.	.	.	.	Groveland.
Young, Hiram A.,	.	.	.	.	Beverly.

Suffolk County.

Allen, F. H.,	.	.	.	.	Boston.
Bangs, Edward A.,	.	.	.	.	Boston.
Bigelow, Homer L.,	.	.	.	.	Boston.
Day, Chester S.,	.	.	.	.	Boston.
Hemmenway, Mrs. Augustus,	.	.	.	.	Boston.
Kimball, H. H.,	.	.	.	.	Boston.
Newcomb, H. H.,	.	.	.	.	Boston.
Shattuck, Geo. C.,	.	.	.	.	Boston.

Norfolk County.

Baldwin, R. N.,	.	.	.	.	Wellesley.
Bent, Herbert A.,	.	.	.	.	Franklin.
Blake, Francis G.,	.	.	.	.	Brookline.
Brastow, Miss A. M.,	.	.	.	.	Wrentham.
Burgess, John K.,	.	.	.	.	Dedham.
Cabot, Louis,	.	.	.	.	Brookline.
Harris, Samuel,	.	.	.	.	East Dedham.
Higbee, Harry G.,	.	.	.	.	Hyde Park.
Horton, I. Chester,	.	.	.	.	Ponkapog.
Kennard, F. H.,	.	.	.	.	Brookline.
McKechnie, F. B.,	.	.	.	.	Ponkapog.
Richards, Miss Harriet E.,	.	.	.	.	Brookline.
Richardson, John K.,	.	.	.	.	Wellesley.
Searle, Frank,	.	.	.	.	Franklin.
Thayer, Otis,	.	.	.	.	West Quincy.
Webster, Frank B.,	.	.	.	.	Hyde Park.

Bristol County.

Alger, Isaac,	.	.	.	.	Attleborough.
Bent, Arthur C.,	.	.	.	.	Taunton.
Fleck, Miss Effie,	.	.	.	.	Pottersville.
Mosher, F. H.,	.	.	.	.	Dartmouth.
Packard, H. R.,	.	.	.	.	Attleborough.
Proctor, Frank W.,	.	.	.	.	Fairhaven.
Slade, Elisha,	.	.	.	.	Somerset.
Stanley, Mrs. Mary R.,	.	.	.	.	North Attleborough.
Sullivan, James H.,	.	.	.	.	Westport.
Tinkham, Mrs. Carrie P.,	.	.	.	.	North Raynham.
Tinkham, H. W.,	.	.	.	.	Swansea.
Wharmbly, Isaac,	.	.	.	.	Fall River.
Winter, Wm. C.,	.	.	.	.	Mansfield.

Plymouth County.

Barnes, Miss Agnes G.,	.	.	.	.	.	Plymouth.
Bigelow, Henry B.,	.	.	.	.	.	Cohasset.
Bourne, J. H.,	.	.	.	.	.	Marshfield.
Brown, Mrs. Walter L.,	.	.	.	.	.	Brockton.
Carr, Rufus H.,	.	.	.	.	.	Broekton.
Dickson, Chas.,	.	.	.	.	.	Plymouth.
Delano, John W.,	.	.	.	.	.	Marion.
Dyke, Arthur C.,	.	.	.	.	.	Bridgewater.
Kennedy, Mrs. A. M.,	.	.	.	.	.	Whitman.
McMenamen, Miss S. E.,	.	.	.	.	.	Westdale.
Miles, Mrs. Henry A.,	.	.	.	.	.	Hingham.
Shurtleff, Walter D.,	.	.	.	.	.	Plymouth.
Southworth, A. C.,	.	.	.	.	.	Lakeville.
Thomas, Dr. F. S.,	.	.	.	.	.	Hanson.
Valler, I. H.,	.	.	.	.	.	Plymouth.

Barnstable County.

Brown, Miss Bertha M.,	.	.	.	.	.	Hyannis.
Clark, J. A.,	.	.	.	.	.	Eastham.
Day, Chester S.,	.	.	.	.	.	Chathamport.
Hammond, W. F.,	.	.	.	.	.	Mashpee.
Meigs, Wm.,	.	.	.	.	.	South Sandwich.
Nye, D. D.,	.	.	.	.	.	Bourne.

Nantucket County.

Dunham, W. C.,	Nantucket.
Mackay, Geo. H.,	Nantucket.

Dukes County.

Look, James,	West Tisbury.
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*Correspondents from Other States.**Maine.*

Moulton, Herbert,	Hiram.
Pike, Fred,	Cornish.

New Hampshire.

Lane, G. W.,	.	.	.	.	.	Chichester.
Thayer, Abbot H.,	.	.	.	.	.	Monadnock.

Vermont.

Barber, Dr. Geo. F.,	.	.	.	.	.	Brattleboro'.
Davenport, Mrs. E. B.,	.	.	.	.	.	Brattleboro'.
Perkins, Dr. G. H.,	.	.	.	.	.	Burlington.
Votey, Prof. J. W.,	.	.	.	.	.	Burlington.

Rhode Island.

Burdick, H. Hillyer,	.	.	.	.	.	Quonochontaug.
Hathaway, H. S.,	.	.	.	.	.	Providence.
Lewis, Edwin R.,	.	.	.	.	.	Westerly.
Mearns, Dr. Edgar A.,	.	.	.	.	.	Newport.

Connecticut.

Curtiss, Robert W.,	.	.	.	.	.	Stratford.
Geer, E. Hart,	Hadlyme.
Wright, Mrs. Mabel O.,	Fairfield.

New York.

Roosevelt, Theodore,	Oyster Bay, L. I.
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New Jersey.

Chapman, Frank M.,	Englewood.
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Pennsylvania.

Pennock, Prof. C. J.,	Kennet Square.
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District of Columbia.

Palmer, Dr. T. S.,	Washington.
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